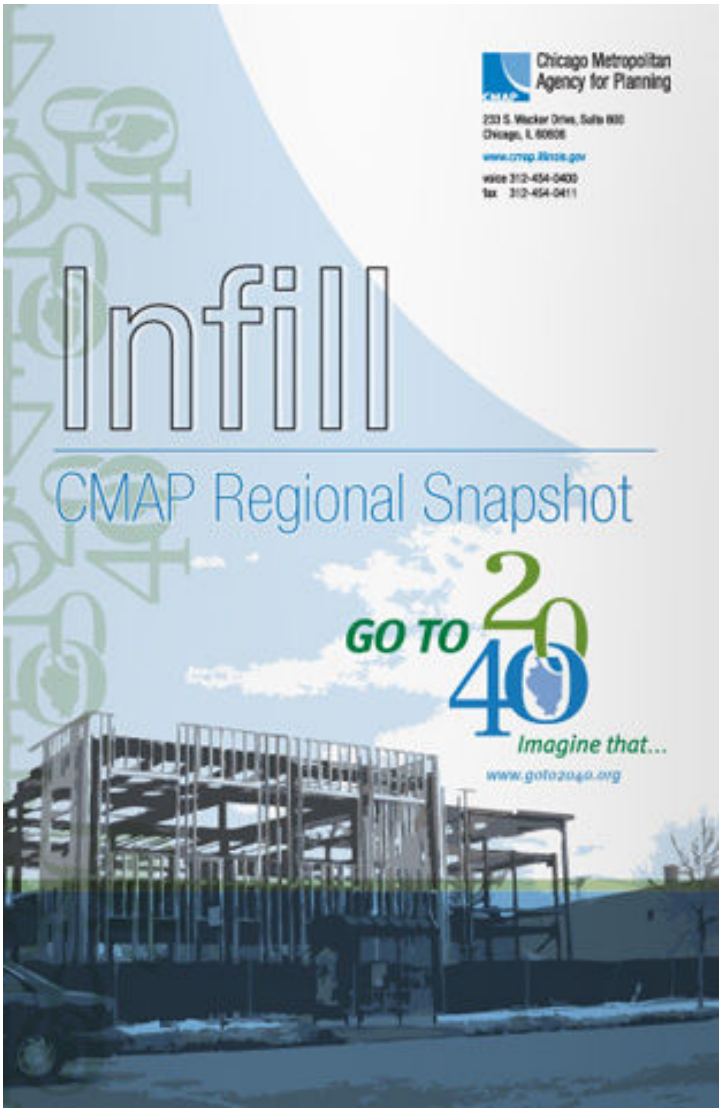
Infill Snapshot Technical Report Draft

3.28.08



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Contributors

Lindsay Banks
Annie Byrne
Jieun Kim
Matt Stratton

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Executive Summary

Growth along the urban fringe has put strains on municipal services, road capacity, and the environment. Urban infill development is a planning strategy that redirects growth from the urban and suburban fringes, or greenfields, into under-utilized urban cores to create compact, livable, and sustainable communities. This report identifies land suitable for infill development in the seven-county region. The report uses tax assessor data to locate vacant land and to calculate the Improvement-to-Land Value Ratio (I/L Ratio) to identify potentially underutilized land. In Cook County, there are 35,672 acres of vacant land, over 10,010 acres of potentially underutilized residential land, and 21,557 acres of potentially underutilized commercial and industrial land. In the remaining 6 counties, there are 73,644 acres of vacant land, over 64,000 acres of potentially underutilized residential land, and over 45,000 acres of potentially underutilized commercial and industrial land. These calculations do not include any land that is classified as agricultural farmland or rural residential. They strictly refer to land within current municipal boundaries that is zoned for residential, commercial, or industrial. The accuracy of the numbers is reflective of the accuracy and consistency of the tax assessor data provided from each county. Before making any recommendations about these sites, CMAP will hold a series of workshops throughout the region to get a better understanding of the unique challenges and opportunities our communities face.

The region is projected to gain 2.8 million people and 1.8 million jobs by the year 2040. Without significantly altering current density levels, municipalities could accommodate hundreds of thousands of housing units by developing just the vacant parcels. If density levels are increased slightly, and utilization of underutilized parcels is improved, there would be potential for significantly more infill development and more conservation of land. This report examines the regional importance of infill development and identifies where infill opportunities exist in the region.

The purpose of this Regional Snapshot is to begin answering the question of how much growth between now and 2040 can be expected to occur on infill sites within existing communities. This report does not, however, make specific redevelopment proposals or recommend immediate actions. Recommendations of this type will be made in the GO TO 2040 plan in coordination with local decision makers. This Regional Snapshot is meant to inspire discussion between CMAP, its partners, and other stakeholders concerning the benefits and desired levels of infill and redevelopment.

1. Introduction

Between now and 2040, northeastern Illinois is estimated to grow by nearly three million people. Without good planning, this growth could strain the region's infrastructure, consume its natural resources, and overwhelm its social systems. But if we plan effectively as a region, the additional people and jobs can strengthen our communities and contribute to a thriving economy. Successful management of regional growth may depend on how much redevelopment happens on infill sites within established communities where roads, water treatment facilities, and public services are available, as opposed to new development beyond the urban fringe where such infrastructure does not currently exist. The composite effects of continued low-density development will have lasting negative impacts on traffic congestion, air quality, water availability and quality, and the environment. One strategy to absorb growth in a sustainable way, hailed by planning professionals nationally and identified in the Chicago Area Transportation Study's 2030 Regional Transportation Plan and Northeastern Illinois Planning Commission's 2040 Regional Framework Plan, is the use of urban infill.

Urban infill is the process of developing vacant and underutilized land in areas that are already covered by municipal services and infrastructure. Vacant properties left undeveloped are a threat to any community. More than a development potential, their mere existence strains the local economy. As noted by the National Vacant Properties Campaign in *Vacant Properties: The True Cost to Communities* (2005):

> [Vacant properties] strain the resources of local police, fire, building, and health departments, depreciate property values, reduce property tax revenue, attract crime, and degrade the quality of life of remaining residents.

Urban infill is a widely popular planning strategy because it addresses these problems while helping to protect agricultural land and open space by redirecting growth into more centralized cores. The purpose of this report is to determine how much land within the seven county region shows potential for urban infill development and to identify the areas with ideal infill characteristics. Infill development can include open space development, employment centers, and residential development. Reinvesting in existing communities and utilizing existing resources benefits the entire region.

1.1 The Need to Address Infill

The study area is the seven-county region comprised of Cook, DuPage, Kane, Kendall, Lake, McHenry, and Will counties (***Figure 1***). With 7,305 square miles and 1,293 people per square mile, the Chicago region ranks in the top 1 % in population density when compared with the other 932 Core Based Statistical Areas in the US (CMAP 2007)(***Figure 2***). It ranks third in population behind the New York and Los Angeles regions. All counties have seen an increase in population size between 1990 and 2000 ranging from 5.3% in Cook County to 41.9% in McHenry (U.S. Bureau of the Census, 1990 & 2000). McHenry, Kane, Will and Kendall counties are all experiencing rapid growth and have large areas of valuable agricultural land and other natural resources that are at risk of being consumed by new development.

Redeveloping infill sites can offer substantial benefits. It can revitalize stressed communities, increase tax revenues, provide opportunities to create affordable housing, preserve natural resources in undeveloped areas, and effectively use existing infrastructure and services. From an economic perspective, infill development can be a win-win strategy. Added residents and businesses contribute to tax revenue without creating much additional demand for new municipal infrastructure such as roads, sewers, or electrical lines. For example, after significant transit-oriented development (TOD) and infill, Evanston increased its total equalized assessed value by 191 % from 1985 to 2004 and has seen its lowest tax rates since 1971. From an environmental perspective, infill development prevents consumption of valuable agricultural land, improves air quality by reducing vehicle miles traveled, and reduces energy consumption. Also, infill development can improve equity, as it often involves reinvestment in communities with declining tax bases.

The northeastern Illinois region has embraced the concept of infill in past plans. Before being merged with the Chicago Area Transportation Study (CATS) to form CMAP, the Northeastern Illinois Planning Commission's Regional Framework Plan published in 2005 identified infill and redevelopment as a key implementation strategy, recommending that future plans identify potential infill sites and support the redevelopment of these sites. Also, the CATS 2030 Regional Transportation Plan supports infill as a means to reduce pressure on transportation infrastructure.

Despite the benefits of infill and the support of past plans for this development strategy, challenges to infill development still remain: difficulty consolidating parcels, general apprehension toward increased density, and often higher private development costs. Additionally, some areas have outdated regulations, such as excessive parking requirements, that make it easier to develop greenfields than to build on infill sites.

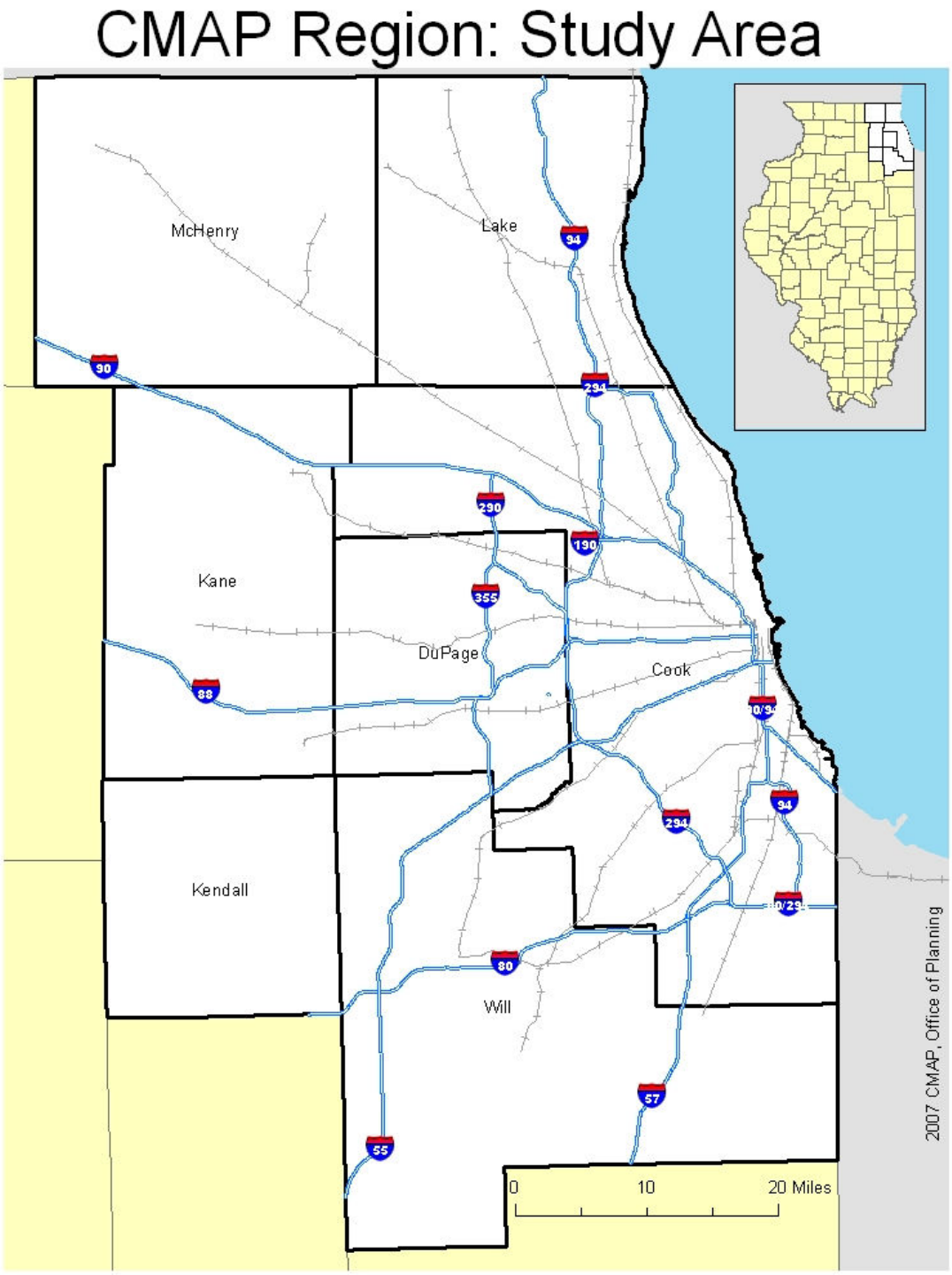

Figure 1. CMAP Region: Study Area

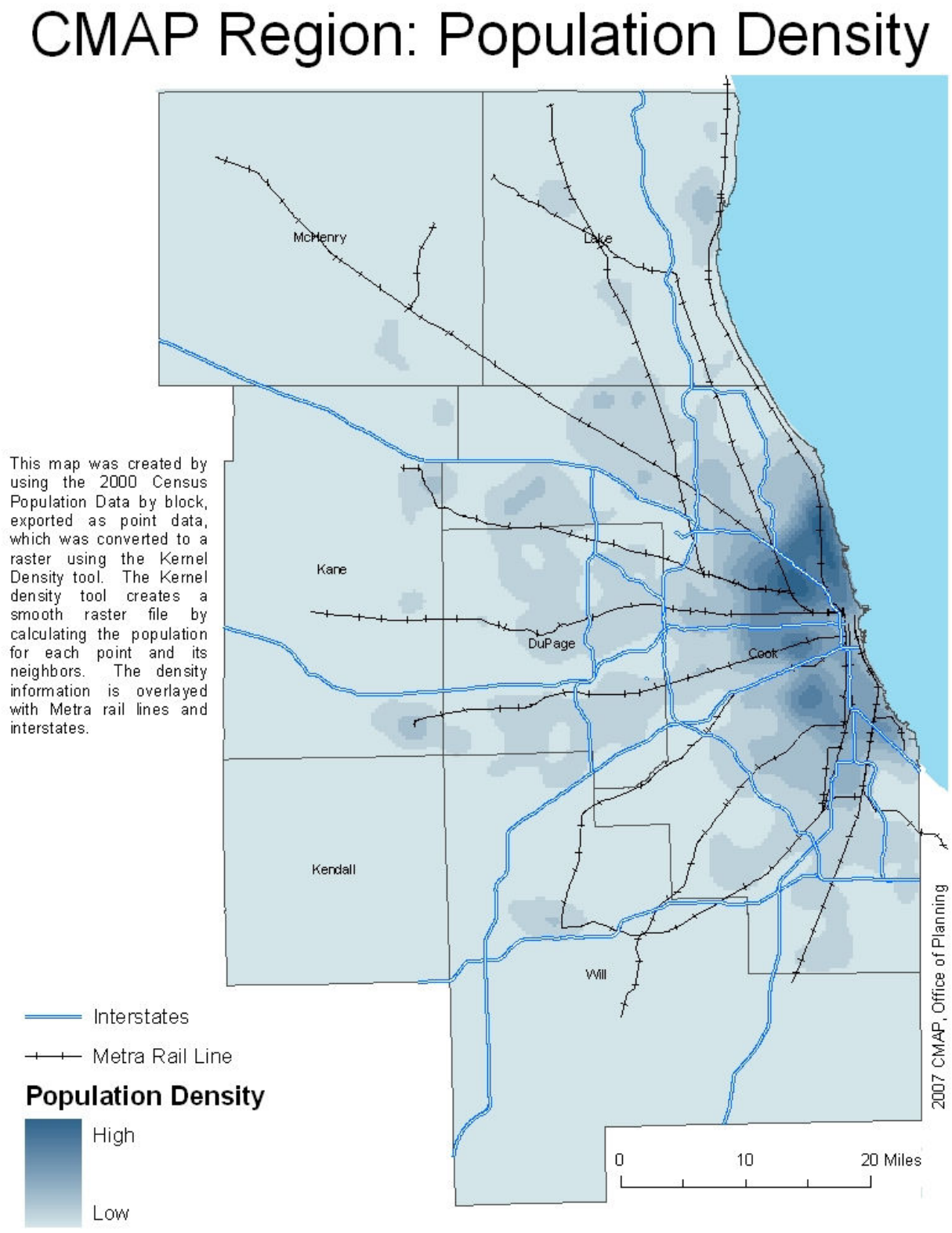

Figure 2. Population Density (Source: U.S. Census Bureau, 2000)

2. Urban Infill Concepts and Definitions

Infill development can range from a single parcel to a large-scale development project. As defined in this report, potential infill parcels must lie within current municipal boundaries, have an area greater than 2,000 square feet, and cannot be designated as open space or agriculture. For the purpose of this study, it is necessary to clarify a number of terms that are commonly associated with urban infill, but which may have different meanings in different jurisdictions. The following is a list of definitions that were compiled based on similar research conducted throughout the nation.

- **Brownfield –** Formerly industrial or commercial properties that are contaminated, or perceived to be contaminated, in some way and would require special clean-up before development can occur.
- **Buildable Lands –** *see* Land Suitable for Infill.
- **Greenfield –** Undeveloped open space or agricultural land.
- **Greyfield –** Commercial or retail properties that have become old, obsolete or abandoned (i.e. abandoned 'big box' stores and strip malls).
- **Improvement/Land Value Ratio (I/L Ratio)** – The value of a parcel's improvements (buildings or other structures) divided by the value of the land. This Ratio helps determine the economic utility of the parcel.
- **Land Suitable for Infill –** All vacant, partially-used, and underutilized land within populated places that is zoned commercial, industrial, or residential that is not for public use and is not restricted by other factors (such as environmental concerns).
- **Partially-used Land –** Parcels of land that are occupied by a use consistent with zoning, but which contain enough land to subdivide into more parcels.
- **Recyclable Land –** Developed and improved parcels that are economically underutilized.
- **Underutilized Land –** Parcels of land that are zoned for more intensive use than that which currently occupies the property, as determined by the Improvement to Land Value Ratio (I/L Ratio).
- **Vacant Parcels –** Parcels of land that may be publicly- or privately-owned, have no structures, or have structures of very little value, and are not designated open space or agricultural land. The structures may be abandoned, boarded up, or partially destroyed.

3. Application to the Regional Comprehensive Plan

The 2040 Regional Comprehensive Planning Process involves six steps (***Figure 3***). The process begins by focusing the vision of our ideal future for the region. After the vision is developed, the next step is to understand current conditions, through a series of "Snapshot" reports, such as this one. With an understanding of *where we are* and *where we want to be*, the next step is to determine *how to get there*. This is done through a series of strategy analyses, examining the effects of potential implementation strategies. Next, CMAP will use scenario modeling to compare potential future scenarios with the regional vision, select a preferred scenario that best matches the vision and recommend policies and major capital investments to implement the scenario. By selecting capital investments after scenario modeling, CMAP is helping to ensure that the investments will guide our region towards the preferable vision for the future.

NIPC's Regional Framework Plan identified the need for infill development as a strategy to prepare for future growth to create a more sustainable region. This report is to assess the potential for infill development in the region. This information will be used in the evaluation of infill as a strategy when conducting scenario modeling.

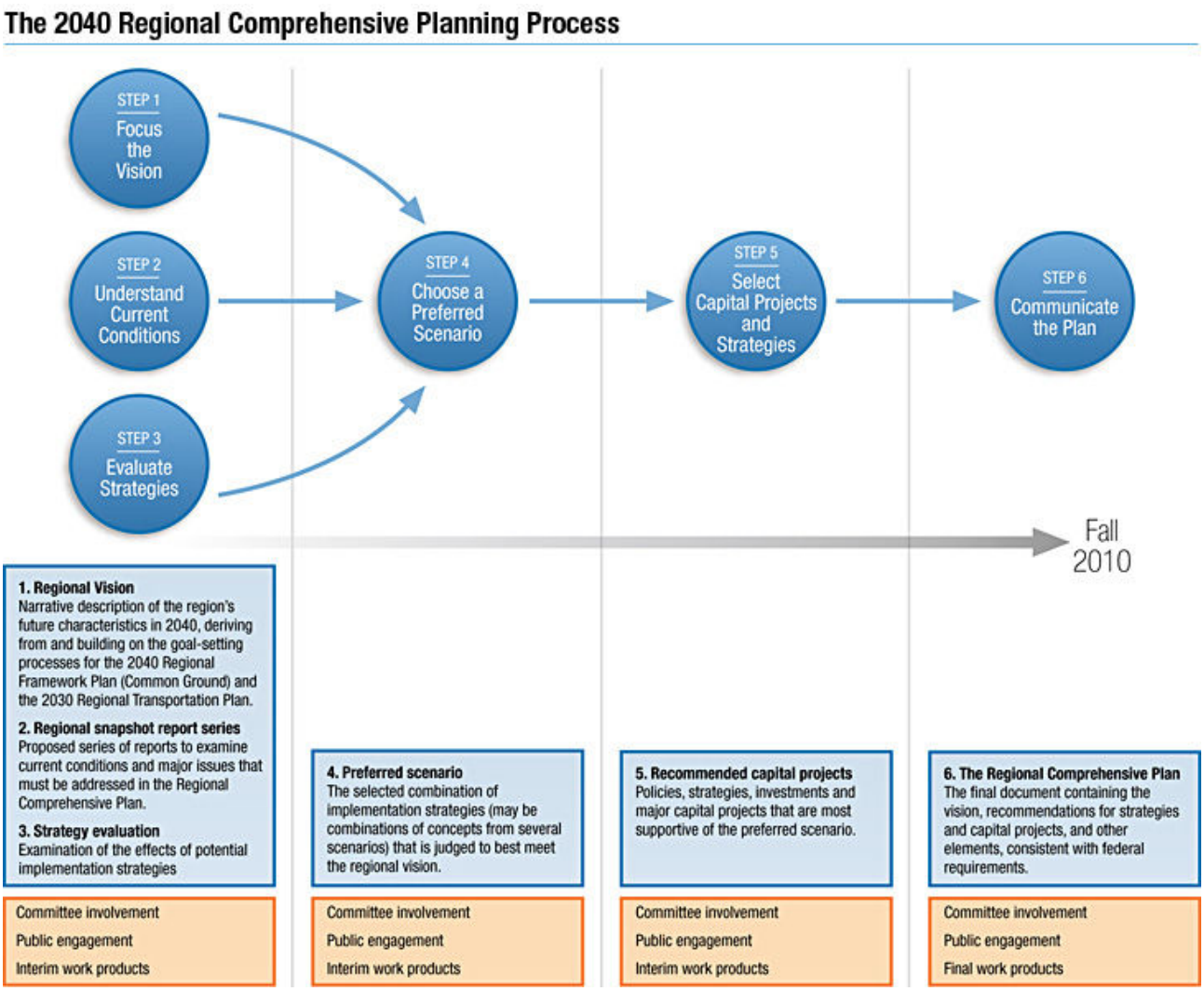

Figure 3. 2040 Regional Comprehensive Planning Process

4. Literature Review

An abundance of research exists that examines the negative effect of vacant lots and the benefits that can be reaped from urban infill. Some metropolitan areas have also tried to quantify the potential for urban infill in their jurisdictions. In this section, we will analyze several examples of such studies completed around the nation to measure infill capacity, including: San Francisco, Portland, Seattle, and Maryland.

4.1 Approaches to Measuring Infill Capacity

Approaches to measuring infill capacity have varying levels of accuracy and comprehensiveness. The main constraints are time and data availability. Carol Hall (2005) identifies three levels of creating vacant land inventories (***Table 1***). With our constraints, we can do a mid-level analysis for the seven counties, with varying levels of accuracy due to inconsistencies in data collection methods.

Table 1. Three methodologies for creating vacant land inventories (Hall 2005, modified)

Accuracy	Unit of Measure	Data	Methodology	Application	Example
Low	Study area sub-units such as census tracts, traffic analysis zones or grids.	▪ Satellite imagery ▪ Land use inventory	Use multi-spectral satellite imagery and land coverage classification system to produce aggregate statistics for geographic sub-units. These units may or may not be spatially uniform.	▪ Produce aggregate statistics for geographic sub-units (i.e. census tracks) ▪ Suitable for general estimation of land supply ▪ The temporal database dimension using change detection enables time series land consumption analysis	
Medium	Parcels	▪ County assessor's record	Use county assessor's vacant land and improvement value data to identify undeveloped tax lots and estimate the amount of undeveloped land existing on partially developed lots. Update periodically using current assessor data.	▪ Easy to identify vacant parcels ▪ Theoretical estimation of underutilized land using I/L Ratio ▪ Least resource intensive ▪ The estimation process makes it difficult to add a temporal dimension to this type of database	▪ California infill housing study ▪ San Francisco Bay area ▪ Seattle, WA
High	Parcels combined with partial tax lots.	▪ Aerial photography ▪ Parcel vector data ▪ County assessor's record	Use aerial photography and GIS tax lot base layers to identify undeveloped and partially developed tax lots. Corroborate with assessor's vacant land and improvement value data.	▪ Resource intensive ▪ Data can be aggregated to subunits in GIS for extensive research and analysis	▪ Portland, Oregon ▪ Maryland

4.1.1 Example #1: San Francisco Bay Area

The San Francisco Bay area includes nine counties and is projected to add 1.5 million people by 2020, which will require between 90,000 and 150,000 acres of land. If this development follows the past trends in the Bay area, this growth will exacerbate sprawl placing increased strain on the natural environment. In an effort to mitigate this foreseeable future, a collaborative infill planning process has been put into place. The State of California has allocated significant resources to understanding the potential and need for infill in developed areas statewide, including bond and tax credits for infill development projects. The process of measuring the

potential and capacity of infill in particular regard to the Bay Area are examined in light of the Chicago area's similar growth patterns and future demand of development.

In order to provide a comprehensive analysis and understanding of the housing infill capacity in the Bay Area that has previously not been achieved, the research team at the Institute of Urban and Regional Development at the University of California at Berkeley conducted a three-phase methodology consisting of identification of potential infill sites, screening for financial feasibility, and projecting density created from infill.

The first phase was to identify potential infill sites. The team obtained parcel data for each of the nine counties in the Bay Area. The data was mapped with GIS and screened to exclude parcels from the inventory of potential infill land for housing based on these criteria: inability to geo-code street address, location outside of the region's 1996 urban footprint, non-urban (determined to be based on one-unit per 1.5 acre or six structures per ten-acre parcel threshold), too small for housing (at least 2000 sq ft), not economically underutilized, Improvement/land Ratio less than or equal to 0.9, environmental constraints, heavy industrial use (potential toxicity from land), and/or location within 100 meters of a superfund site.

The Improvement/Land Value Ratio (I/L Ratio) of 0.9 was determined to be an appropriate cut-off point from results of sensitivity tests. Cautionary note follows to ensure this is merely an identification tool for potential infill sites; actual infill development should and would be determined on a case by case basis.

In order to successfully complete the first phase, several data sources were utilized through other public and private organizations including: Association of Bay Area Governments (ABAG), Metroscan, and the California Farmland Mapping and Monitoring Project. After the data was filtered, the inventory of housing infill parcels was mapped to give a spatial distribution analysis of vacant lots and underutilized lots. Underutilized land, referred to as recyclable sites, are further classified and mapped based on current use (residential versus non-residential).
The second phase was to screen for financial feasibility of single- and multi-family housing. An infill development project is considered to be financially feasible if the developer is expected to make a reasonable profit. All parcels in the infill inventory were run through two financial feasibility models, one for multi-family housing and another for single family homes.

Application to the Northeastern Illinois Region:

The Bay Area's success of estimating the housing infill capacity at such depth seems to be largely contingent on access to detailed data and resources. Data from public and private organizations was needed in each of the three phases. The method for selecting parcels for infill potential is possible for the northeastern IL region. We do not have brownfield data, but can run all other analyses after running sensitivity tests to determine I/L cut-off points. Also, the ideas of testing various density levels and measuring financial feasibility of the infill sites could be used for northeastern IL.

In the third phase of the project, various density scenarios were used to gauge the potential infill capacity of the identified parcels. Due to the differing perspectives on the pros and cons of density, the amount of housing that could be developed was projected at five different residential densities: 125% and 150% of historical densities, and 100%, 125%, and 150% of recent densities. This methodology is applied to all parcels in the infill inventory, including those that were determined to not be financially feasible in phase two. This gives a total of between 890,000 and 1.39 million new households that could be accommodated within the identified infill sites. The same density scenarios were applied to five types of "target" infill areas: transit-rich neighborhoods, job-rich neighborhoods, concentrated poverty neighborhoods, transit corridors/job-rich neighborhoods, and transit corridors/concentrated poverty neighborhoods.

4.1.2 Example #2: Portland

Oregon state law requires local authorities to measure 20-year land supply for projected jobs and housing needs within the urban growth boundary (UGB), and to update the projections every five years. Metro, the regional government in Portland, established a base vacant land inventory over 10 years ago as a primary support tool for estimating land supply - quantity, location, and development potential of vacant land - within the UGB. The inventory is updated annually.

Metro classifies every tax lot as vacant, partially developed, or developed based on the following rules, which have remained fundamentally unchanged since the inception of the vacant land inventory: ***Vacant lots*** include (1) lots that have no building, improvements or identifiable land use, (2) lots under site development show building activity, but development is incomplete. ***Partially developed lots*** are defined as developed lots that have 1/2 acre (20,000 sq ft) or greater vacant portion. ***Developed lots*** include (1) lots that have improvements and specific land uses (for example, a paved parking lot is developed but an unpaved lot where trucks are parked is vacant), (2) parks and open spaces.

Application to the Northeastern Illinois Region:

For the classification of just one half-million tax lots, Portland Metro spent approximately $44,000. The size of CMAP's jurisdiction (>1.5 million parcels in Cook County alone) is too cost-restrictive to complete a similar study within the timeframe of this report. Metro's annual buildable land inventory serves as a basis for determining land supply within the UGB. Northeastern Illinois does not have an urban growth boundary, and that would make the application of this study less conclusive. This study may have potential for application in the future.

The size and location of the vacant and partially developed tax lots are identified primarily by interpreting aerial photography. In addition, parcel vector data, geocoded building permits, and the county tax assessor's improvement value are used to inform classification. This process relies on visual inspection of the half-million lots within Metro's region by more than one technician. In order to control for inconsistency or bias introduced by subjective judgment, the interpretative decisions made by technician(s) are rule-based and intentionally limited.

Metro's inventory development takes two steps: first they create a database of the gross vacant and developed land for the UGB. The size and location of the vacant and partially developed tax lots are identified primarily by interpreting aerial photography. Partially developed lots are identified by applying the "half-acre rule." While this rule is used to limit subjective interpretation and to avoid unreasonable delay of the identification process, it has also been acknowledged that this would result in an under-count of partially vacant land. To locate parcels that are not captured by the half-acre rule, Metro uses a "refill factor" (a projected rate of refill development) that is drawn from the supplemental redevelopment and infill studies for residential and non-residential lots. Building permits are not used as precise locators of newly developed lots but as indicators. To exclude permits for remodels and alterations, only permits for new construction over $50,000 are used. At this stage, assessment of suitability for development has not been applied to the vacant land.

The second stage is the estimation of buildable land. The inventory created by the above-mentioned process includes vacant lots that might not be suitable for development. This stage is to identify and subtract unbuildable or constrained lots from the database. In subtracting unbuildable lots, Metro removes the following: developed land, land that is a street right-of-way or water body, environmentally and physically constrained land (including flood plains, riparian corridors, steep slopes and wetlands), tax-exempt land (both publicly owned lots and those owned by religious and fraternal organizations), farm tax deferred land (its potential for future industrial uses is being studied), and land platted but not built.

4.1.3 Example #3: Seattle, WA

Various cities and counties in Washington State have developed strategies to assess urban infill potential, mostly around the city of Seattle. Although the Seattle Metropolitan Area is the largest in the Pacific Northwest, at over three million people, it is still much smaller than the Chicago Metropolitan Area. Nevertheless, the development strategies used and methods for evaluating urban infill potential are still relevant.

For the southwest region of Seattle, the city used tax assessor data to calculate developable land. Once the buildable land was calculated with the tax assessor data, they were able to calculate the development capacity for residential and employment centers. The method described in Moudon's paper *Estimating and Analyzing Land Supply and Development Capacity: The Case of Southeast Seattle* (2001) utilized the following formulas for calculating Buildable Lands:

Vacant Land = Assessor designation and/or I/L Ratio < 0.001
Partially Utilized Lands = lot size at 200 percent or more of minimum lot size
Low Rise (LR) Underutilized Lands = Total acres where existing capacity < 40 percent build-out (using zoning data)
Multifamily (MR), Neighborhood Commercial (NC), and Commercial (C) Underutilized Lands = Total acres where ILR < 0.5
Buildable Lands (1,234 acres) = Vacant (460 acres) + Partially Utilized (527 acres) + Underutilized (247 acres)
Net Land Supply (4,359 acres) = Fully Developed (3,138 acres) + Buildable Lands (1,234 acres)

To calculate development capacity, the City of Seattle used this equation:

Residential Development Capacity =
[(SF + LR) x 0.85] + (MR) + (NC+C) – (x)

Where:
SF = Single family homes on vacant and underutilized lots
LR = Low Rise Underutilized lands
SF+LR = Number of units at build-out on partially utilized and vacant land
MR = Multi-family number of dwelling units at build-out on vacant and underutilized lands
NC+C = number of commercial units at build-out on 50 percent of vacant and underutilized lands
x= Existing dwelling units on partially utilized and underutilized lands

Application to the Northeastern Illinois Region:

In Seattle, the I/L Ratio was used to determine vacant properties. For partially utilized land, they calculated land at 200% or more of minimum lot size. That could be completed with ArcGIS functions and zoning data, if the lot size were the same in all municipalities. The resource-intensive part would be calculating the underutilized data and calculating build-out.

It was also determined by CMAP that zoning data, as used in this study, is not accurate enough upon which to base policy and strategies. Zoning may be used for future analyses, but not in the manner consistent with Seattle's methodology.

Following the City of Seattle's "market factor," the SF and LR housing is assumed to be at capacity when it is at 85%, because development may not take place on the entire parcel or at maximum density. This assumption does not apply to MR, NC, and C properties. In this study, the I/L Ratio is used to determine vacant properties, not under-utilized. Using this number, they determined that 11 percent of the land was vacant. If we use the same number for our study, it will be important to understand the differences between Seattle and Chicago and to compare percentages found.

4.1.4 Example #4: Maryland

The State of Maryland Department of Planning (MDP) produced a report titled "*Estimating Residential Development Capacity: A Guidebook for Analysis and Implementation in Maryland*." The report reviews best practices in infill estimation, many of which were pulled from the previously referenced areas of Portland and the State of Washington. Fort Collins, Colorado was also mentioned for their innovative strategies. The analysis done by MDP merges various best practices and estimation techniques from around the country.

The most relevant part of the report is MDP's suggested steps required to estimate development capacity. Local governments are required by state law to submit development capacity analysis reports to MDP, and this guidebook serves as a reference tool for the local authorities. The guidebook includes the following illustration to show the different filters that should be applied to attain the actual amount of developable land (***Figure 4***).

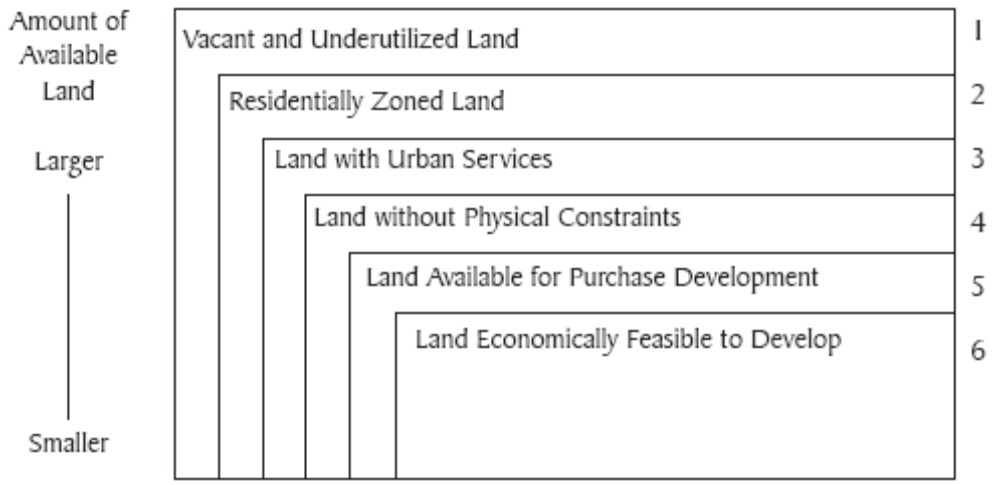

Figure 4. Levels of Developability (Maryland Dept. of Planning)

The Maryland Planning Department's recommended approach was derived from Portland Metro's study, comparing the improvement values of each parcel with the improvement values of the surrounding parcels. This method recognizes variations between neighborhoods. Under this method discussed by MPD, only the worst buildings in each neighborhood would be infill candidates. A similar neighborhood analysis could be applied to our study.

Application to the Northeastern Illinois Region:

Overall, this guidebook can be very helpful to our future research here at CMAP. The next steps that we can use from this guidebook include: identifying "land with urban service," "land without physical constraints," "land available for purchase development," and "land economically feasible to develop." The most logical step to begin with will be to identify land where the physical geography does not prohibit development. The other steps will require more data, as well as further analysis. If we acquire data about urban services such as water, sewer, electricity, and transportation, we will analyze whether or not infill development could be accommodated by the existing infrastructure. This would be an important step in producing a realistic estimate of infill potential.

5. Data & Methodology

5.1 Research Goal

The goal of this research is to calculate the land area potentially suitable for urban infill development, which will provide an understanding of the region's capacity to absorb new population growth around housing and employment centers. There are different ways to identify infill potential, and in consideration of the size of the Chicago region, assessor's data is the best available choice. We combined elements of previously mentioned studies that best suited our region, relying primarily on the I/L Ratio to identify sites that are either underutilized or facing development pressures.

5.2 Research Approach

The research identifies two types of parcels as having infill potential: vacant, and potentially underutilized. Before beginning the analysis, parcels outside of current municipal boundaries, with an area of less than 2,000 square feet, or designated as open space or agriculture were eliminated. The remaining parcels were divided in two groups—vacant and underutilized. Those classified as vacant by tax assessor data were selected as good candidates for redevelopment. And underutilized parcels were determined using the I/L Ratio to identify parcels where the assessed land value is higher than the assessed value of the improvements, or built structures, on it.

Different cut-off points to identify underutilized parcels were used depending on the assessed use (***Figure 9***, ***Figure 12***, ***Figure 13***). The following analysis counts total acreage of vacant and potentially underutilized land without consideration for parcel groupings or size. (The data source is 2007 tax assessor records, by county). For residential single-family, residential multi-family, and mixed commercial/residential parcels, we used an Improvement/Land Ratio (I/L Ratio) of 1.0, 1.5, and 1.5, respectively. Many other studies used Ratios of 1.0 or 0.9 for residential single-family parcels. For residential multi-family and mixed commercial/residential properties, we used higher cut-off points because of typically higher assessed values, compared to a single family home on a similar sized parcel. Kendall, McHenry, and Will Counties have only a residential classification and do not identify any parcels as multi-family. We used a cut-off point of 1.0 for these parcels. Only Cook County identifies mixed commercial/residential parcels. Will County does not identify vacant parcels.

Our method of identifying infill land began with the identification of vacant and underutilized land. Vacant land is identified by assessor data unless it is "exempt." The assessor's data provides very little information about exempt properties. Exempt property may include forest preserves, schools, government buildings, and any vacant property that is owned by the municipality (***Figure 5***). We solved this problem in Chicago by obtaining a list of vacant parcels owned by the City of Chicago (***Figure 6***). These parcels are listed as "exempt" by the assessor's office because the parcels are publicly owned, and therefore do not owe property taxes. This was important to do as vacant land owned by the government is likely to be prime land for infill development.

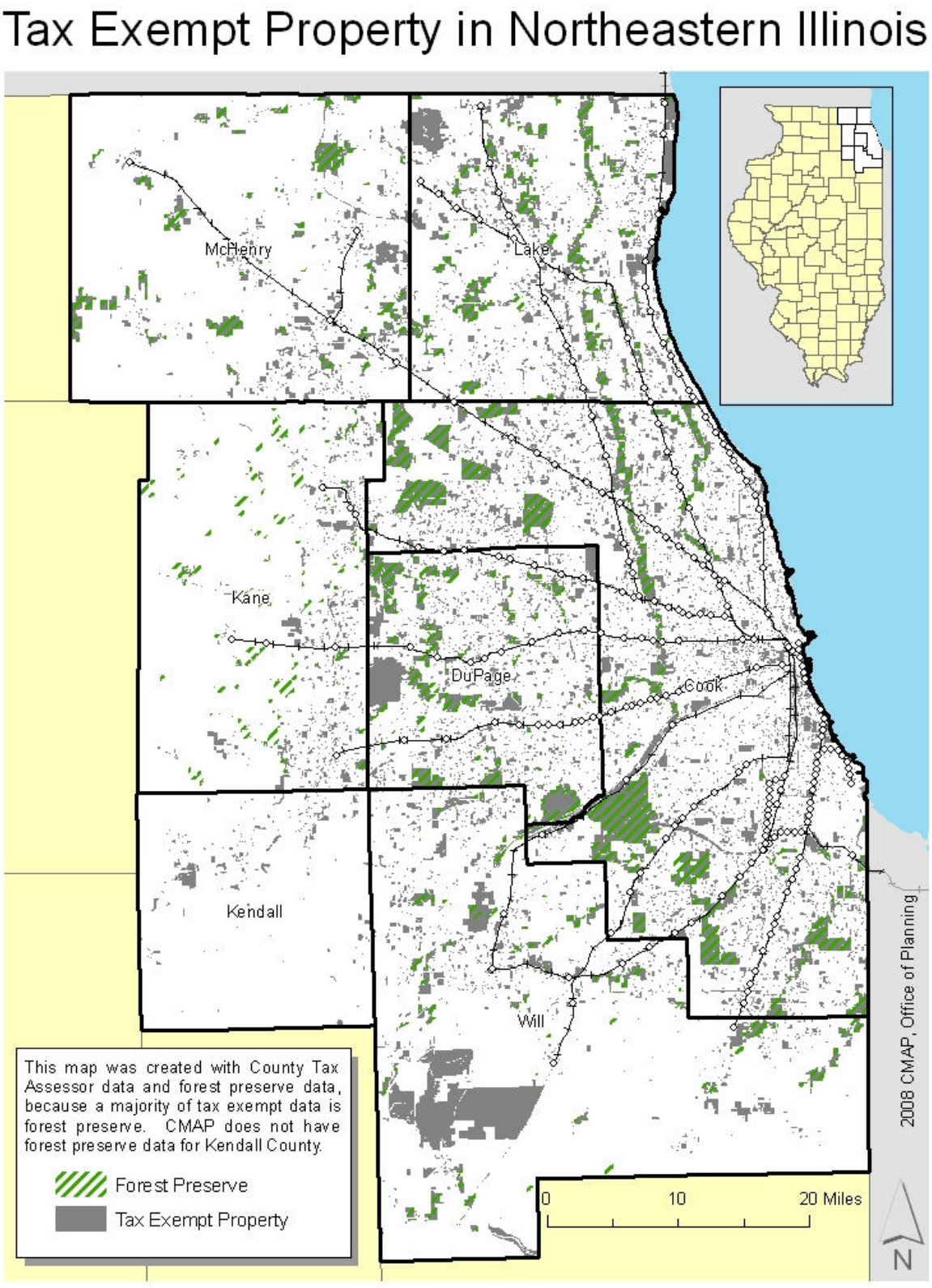

Figure 5. Tax Exempt Property in northeastern Illinois

5.3 Data & Limitations

For this study, the primary data source is county tax assessor data. Each county has a different tax assessing body and different land use classifications. There is an effort underway to coordinate data collection and make it consistent across jurisdictions, but as of the publication of this study, it has not happened. Some counties have large parking lots that are classified as "exempt," and could potentially be underutilized, but would not be captured because they have no tax data. Some counties have many parcels identified as vacant, but examination of aerial photography shows that some of the parcels have been developed for years. With more efficient and accurate data, this study would yield better results.

In addition to data accuracy, there are other limitations to this study. First, we do not have the resources to visit every parcel to determine utilization or underutilization. Aerial photography does not yield enough information for our preferred method of analysis; it would also be too time-consuming to examine the vacancy of every parcel. Second, we have not collected data on brownfields and the development potential of the sites. There will be a CMAP Strategy Analysis Report examining the regional costs and benefits of developing brownfields in detail. Third, more in-depth prioritization of the development of infill sites will need to be determined by individual municipalities. And fourth, we did not use zoning data for our analysis. Measuring density levels allowed by land use could help determine infill potential, but variation between municipalities and the fluid nature of zoning regulations make this an undertaking too difficult for our agency at present. Also, properties that are exempt from taxes are not included in the analysis. As you can see from the image above (***Figure 5***), exempt classification applies to a large number of parcels.

The initial study was completed for Cook County, where data was readily available and was extended to the other six counties as more data was collected. The methodology is the same for each county, although the quality of the data may vary. The section on Cook County is more detailed as it thoroughly explains the research method used.

6. Analysis Results for Cook County

Of 1.4 million tax lots in Cook county, 0.9 million (65%) parcels are single family residential parcels and approximately 0.2 million (14%) parcels are multifamily parcels. The number of vacant and exempt parcels amount to 95,120 (6.8%) and 84,861 (6.1%) respectively. Vacant parcels account for 11.22% (37,672 acres) of the total acreage of Cook county tax lot (***Table 2***).

Table 2. Cook County Parcel Summary (City of Chicago, 2006)

Category	Number of parcels		Total Acreage		Average Lot Size(sq ft)	I/L Ratio (Average)
	count	%	Acres	%		
Total	1,401,403	100.00%	335,742	100.00%	11,041	-
Vacant	95,120	6.79%	37,672	11.22%	17,108	-
Exempt	84,861	6.06%	-	-	-	-
Single Family	906,086	64.66%	164,693	49.05%	7,903	4.14
Multi Family	196,612	14.03%	31,137	9.27%	6,886	7.31
Commercial	65,573	4.68%	42,902	12.78%	28,488	2.50
Mixed commercial	3,106	0.22%	503	0.15%	7,067	5.80
Industrial	27,027	1.93%	37,489	11.17%	60,337	3.55
Others	23,018	1.64%	21,346	6.36%	51,554	6.51

6.1 Vacant parcels

There are a total of 95,920 vacant parcels in Cook County, 60% of which are located in the City of Chicago, yet this represents just more than 20% of all vacant acres in Cook County. Of the vacant parcels in Chicago, 70,542 parcels (30,976 acres) are not owned by the City (***Table 3***). The City of Chicago owns 26% of all vacant parcels and 13% of total vacant land area.

Table 3. Vacant Parcels in the City of Chicago (City of Chicago, 2006)

Vacant land	Number of Parcels	Acres
City of Chicago Owned	25,378	4,696
Non-City of Chicago Owned	70,542	30,976
Total	**95,920**	**35,672**

Table 4. Vacant Parcels in the City of Chicago (City of Chicago, 2006)

Zoning	Number of Parcels	Acres
Residential	14,418	1,599
Commercial	5,526	759
Industrial	2,904	1,164
Mixed Use	91	23
Planned Development	2,202	1,051
Park Space	238	99
Total	**25,379**	**4,695**

The following maps show the city-owned vacant land (***Figure 6***), and census blocks with vacant land by acres (***Figure 7***) and by number of parcels (***Figure 8***). Viewing the vacant land in acres is useful to see the actual amount of vacant land available. However, it is also useful to see the number of parcels that are vacant. Some areas have more parcels of vacant land but less in acres; this is most common in Chicago and other more developed areas. This trend is due to variation in parcel size. The type of development that is appropriate and can be accommodated on vacant land will vary due to this and other variations in parcel attributes. Barriers to infill development on vacant parcels include small parcels and contiguous parcels that are under different ownership. Areas that have a higher amount of this type of vacant land will need to adopt different infill strategies to be effective than those that have fewer but larger parcels of vacant land.

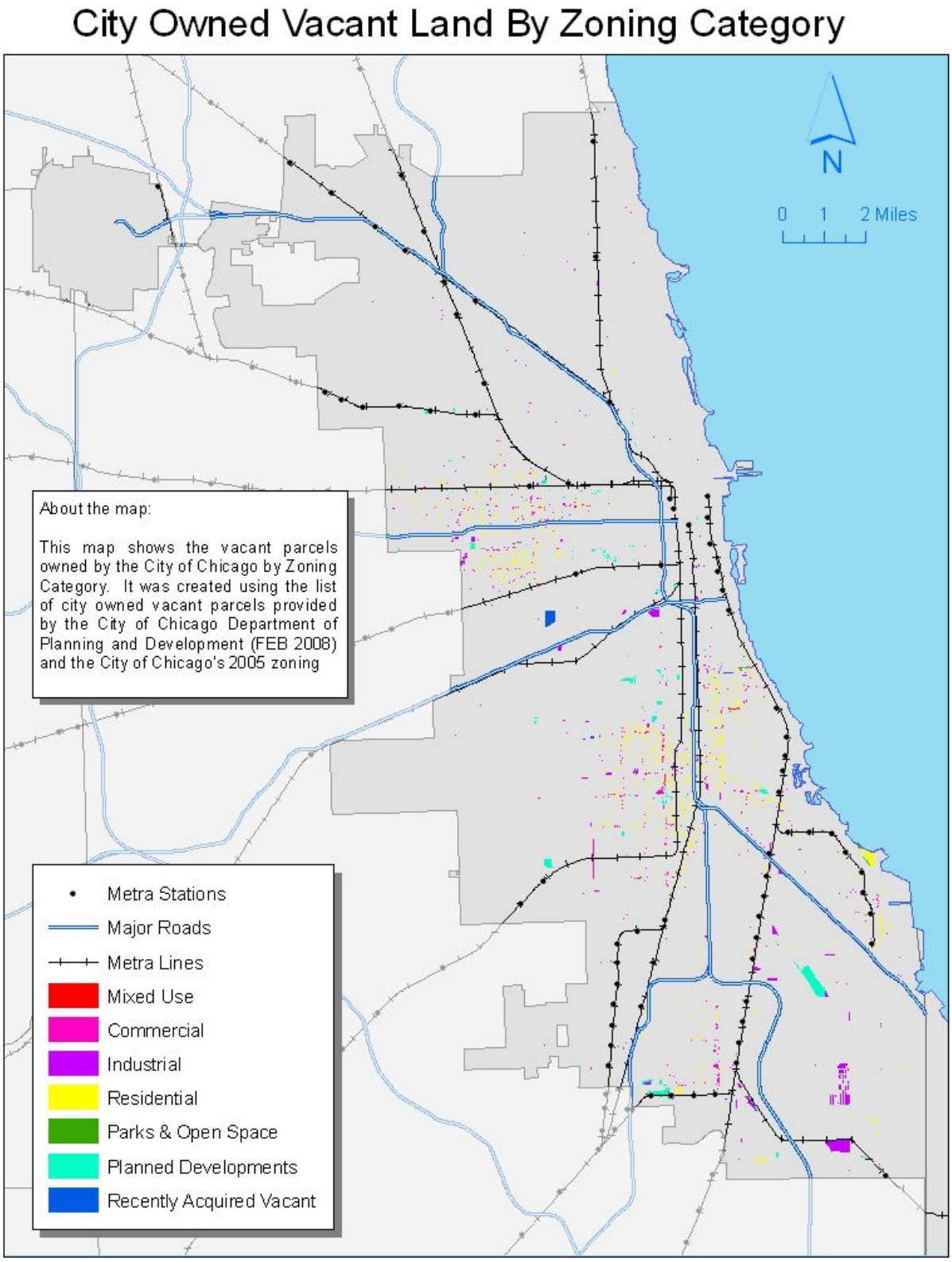

Figure 6. City-owned Vacant Land by Zoning Category

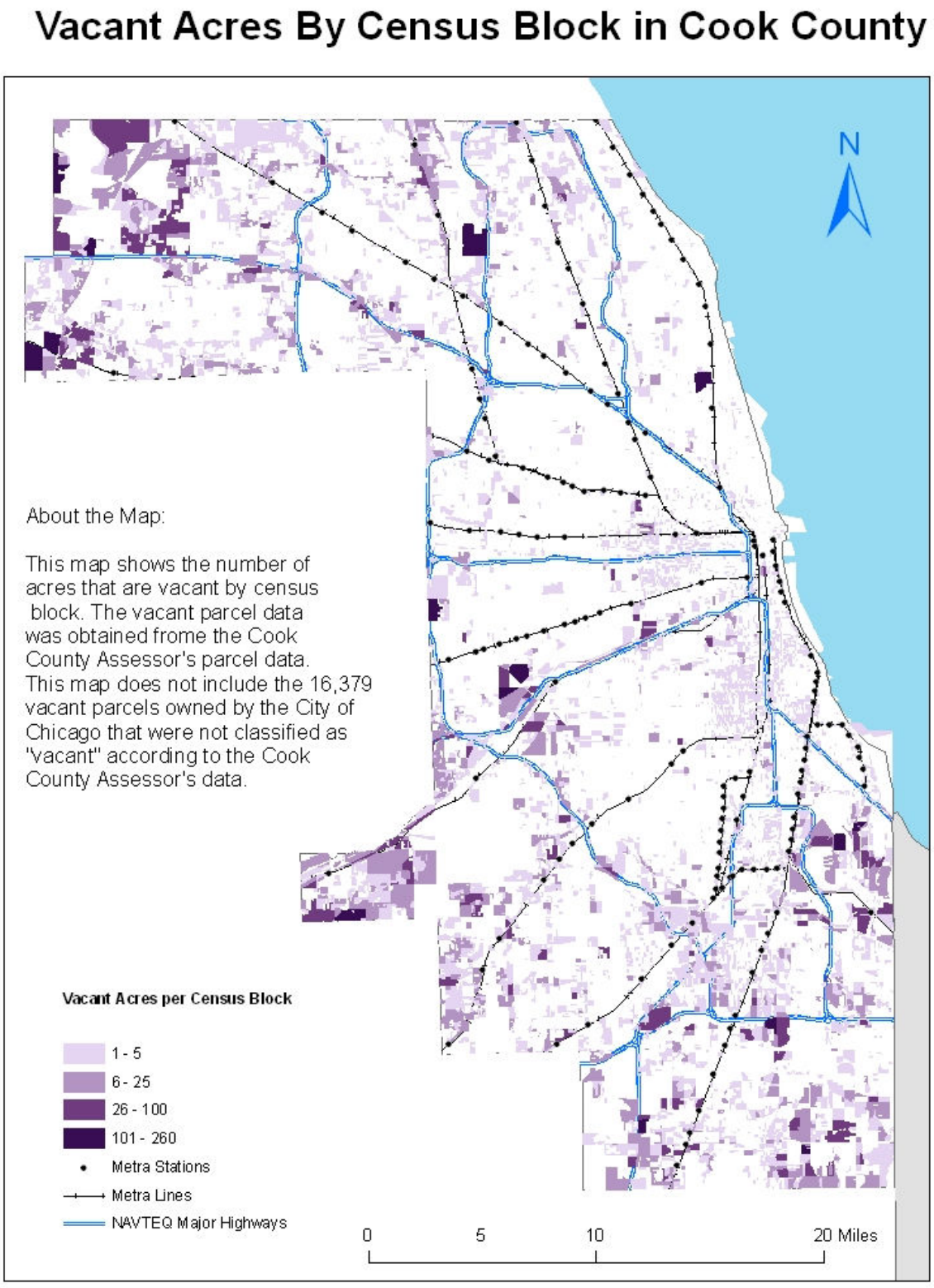

Figure 7. Vacant Acres by Census Block (Cook County, 2006)

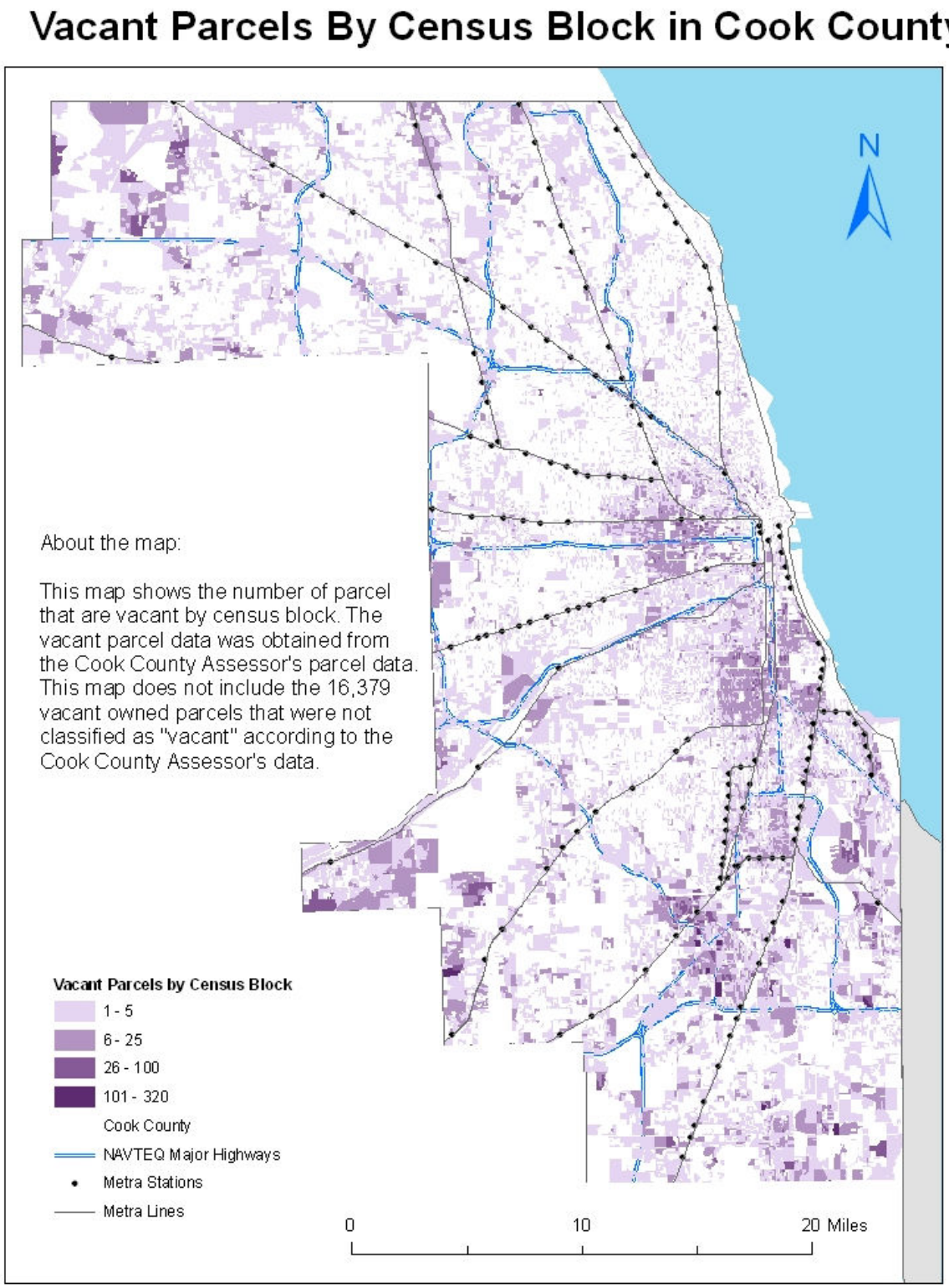

Figure 8. Vacant Parcels by Census Block (Cook County, 2006)

6.2 Cook County Residential Parcels

Of the 1,102,698 residential parcels, 82% are single-family and 18% are multi family (***Table 5***). There are 11,828 potentially underutilized single family residential parcels - parcels of which I/L Ratios are less than 1 - in Cook County, which is 1.3% of the total number of single family residential tax lots and 5.3% of total acreage. Of 196,612 multi-family residential parcels, 2,473 parcels (1.3%) are potentially underutilized (I/L Ratio<=1.5).

Table 5. Estimation of Underutilized Residential Parcels in Cook County

Residential Parcels		Total	Single-family	Multi-family
Underutilized	count	14,301	11,828	2,473
	acreage	10,010	8,781	1,229
Developed	count	1,088,397	894,258	194,139
	acreage	185,820	155,912	29,908
Total	count	1,102,698	906,086	196,612
	acreage	195,830	164,693	31,137

We selected different cutoff points for single-family and multi-family residential parcels, 1 and 1.5 respectively, to determine whether a parcel is potentially underutilized. The criteria are based on the distribution of I/L Ratios and certain assumptions. It is assumed that a parcel is economically underutilized if its improvements have less value than its land. Having a lower ratio, however, does not necessarily mean a parcel or its improvement(s) has a lower value since the ratio is a relative measure. Two factors can lead to lower I/L Ratios - larger size of land or higher land value. For example, expensive houses sitting on large parcels might have lower I/L Ratios than lower value houses built on inexpensive and small parcels.

It is assumed that multi-family parcels will generally have higher I/L Ratios because there should be more than two units in a parcel. For this reason, a cutoff point of 1.5 was selected. Although tax assessor data keeps separate records for each multi-family unit and its portion of land, the I/L Ratios would still be higher because each unit generally takes up a smaller amount of land than single family homes.

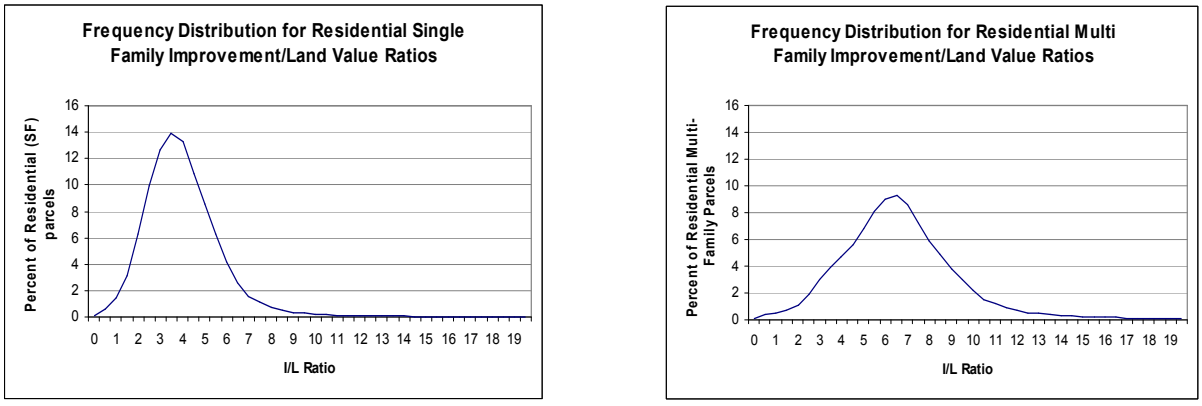

Figure 9. Frequency Distributions of I/L Ratios for Single- and Multi-family Parcels

The map of average I/L Ratio of single-family residential parcels shows that parcels with lower I/L Ratios are generally located further from the central business district and parcels within the Chicago city boundaries tend to have higher I/L Ratios. This could be explained by the typically larger lot size of suburban single-

family homes (***Figure 10***). The map of multi-family parcels' I/L Ratios shows a different distribution pattern. Unlike single-family residential parcels, multi-family parcels are highly concentrated around downtown Chicago (***Figure 11***), but the distribution of potentially underutilized parcels is spread throughout the county.

Underutilized parcels identified in our analysis are potential candidates for refill development but further analysis and/or site check is necessary. Some parcels may have been identified as underutilized based on a low I/L Ratio when they are not vacant or underutilized. Although this preliminary analysis does not give exact information at the parcel level, it is still worth seeing where underutilized parcels might be located in Cook County. See ***Appendix*** for more information on field checks.

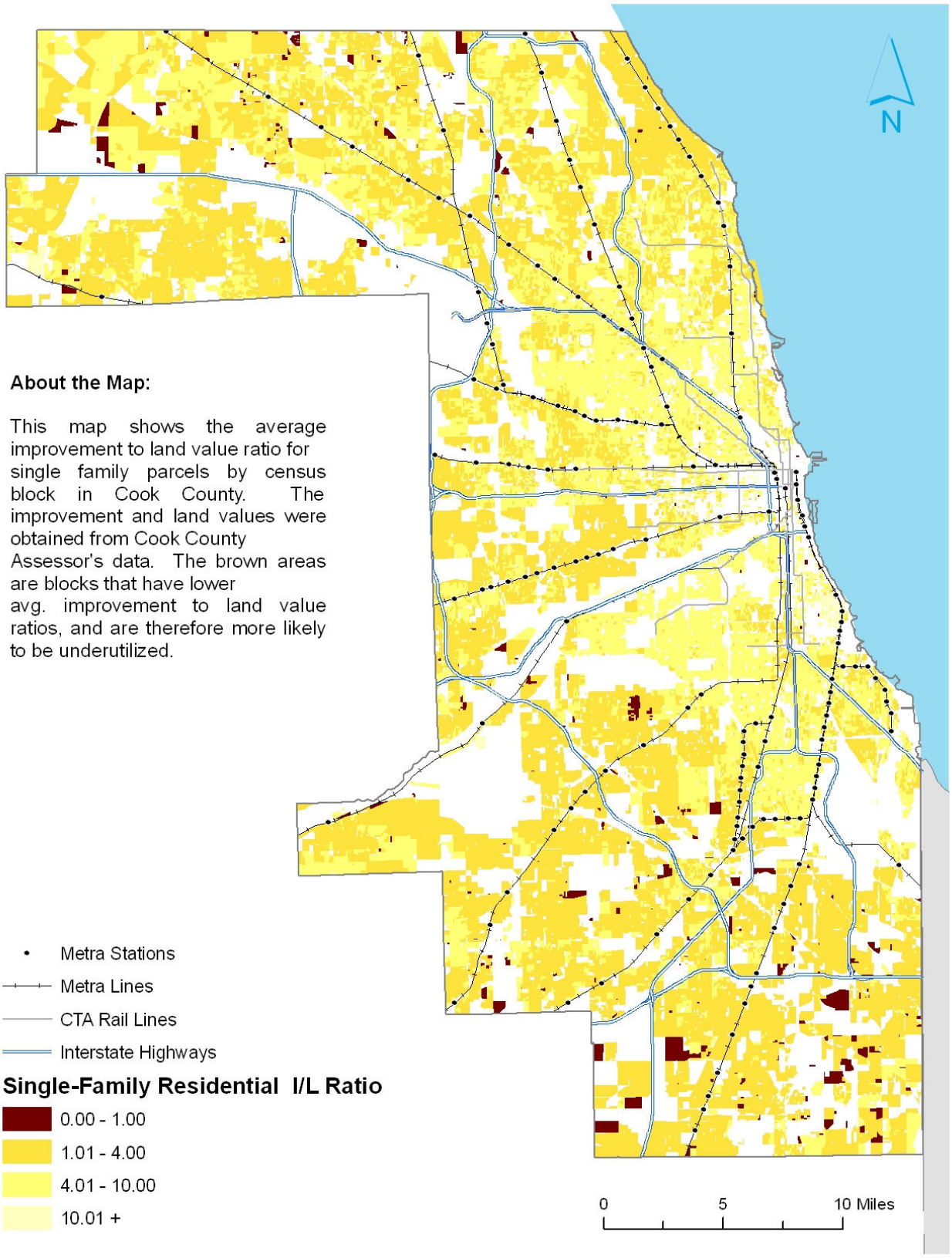

Figure 10. Average I/L Ratio by Census Block: Single-family Residential

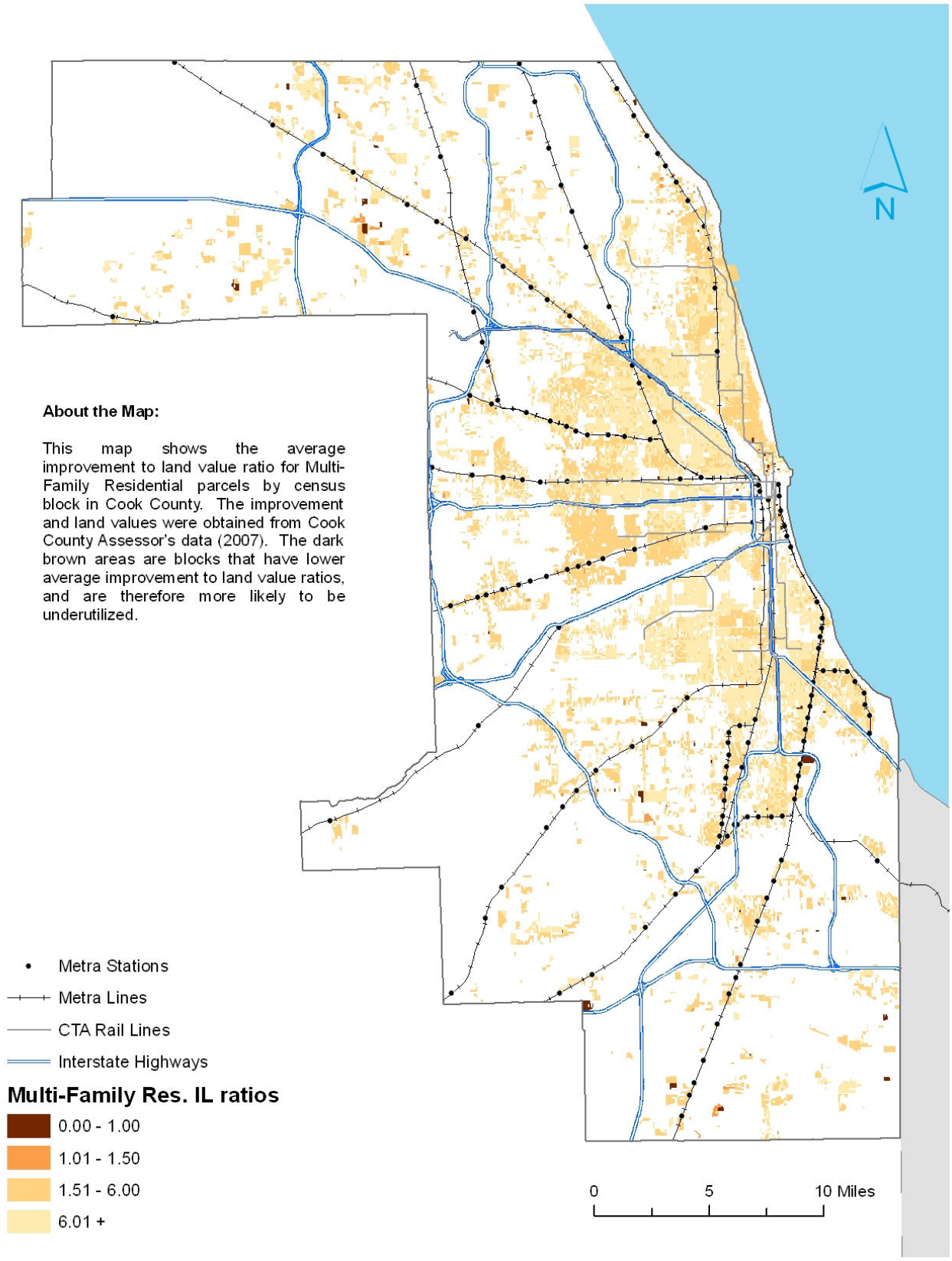

Figure 11. Average I/L Ratio by Census Block: Multi-family Residential

6.3 Cook County Commercial and Industrial Parcels

Using the I/L Ratio cutoff of 0.5 for commercial underutilized and industrial underutilized property, 32.3% of commercial parcels are potentially underutilized. For industrial parcels, 25.3% are potentially underutilized. The table below shows the number of commercial and industrial parcels (developed and potentially underutilized) and the total acreage.

Table 6. Estimation of Underutilized Commercial and Industrial Parcels in Cook County

Class		Total	Commercial	Industrial
Total	count	92,600	65,573	27,027
	acreage	*79,581*	*42,092*	*37,489*
Underutilized	count	28,001	21,167	6,834
	acreage	*21,557*	*12,582*	*8,975*
Developed	count	64,599	44,406	20,193
	acreage	*58,024*	*29,510*	*28,514*

Determining underutilized commercial parcels follows the same process as that of residential underutilized capacity estimation, with a different I/L Ratio cutoff. While residential parcels, both single-family and multi-family parcels show normal distributions, commercial and industrial parcels do not have normal distribution patterns (***Figure 12***). The graphs show that the number of parcels dramatically increases below an I/L Ratio of 1. These patterns imply that commercial and industrial lots might be abandoned if they fall below a certain cut-off point.

Another possible explanation for these distinct distribution patterns could be the nature of land use patterns - commercial uses and their parking spaces often take up large amounts land, of which improvement values would be lower. Industrial buildings also tend to sit on larger parcels for the purpose of parking and/or work space, and their improvement values could be relatively low.

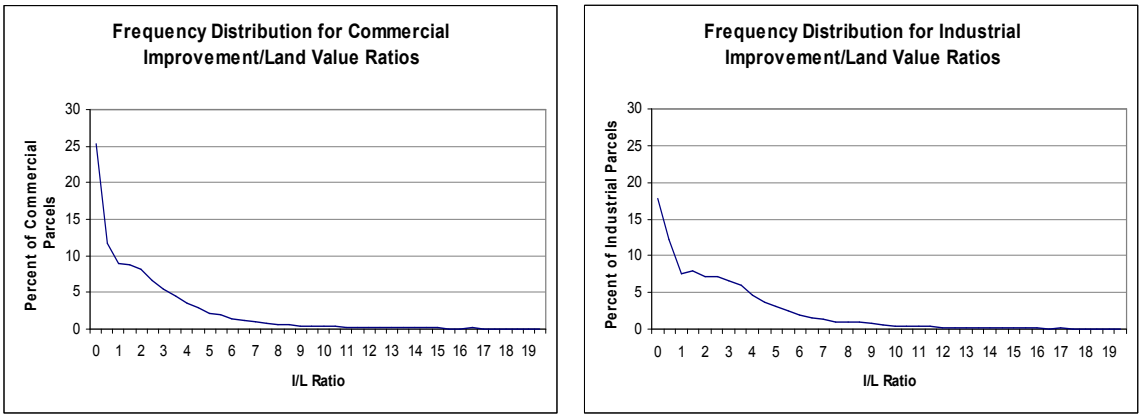

Figure 12. Frequency Distribution for Commercial & Industrial I/L Ratios

To test these assumptions, we randomly picked commercial parcels of which I/L Ratios fall below 1 and checked the Cook County assessor's web-based property information, which includes pictures of each tax lot and its improvement(s). A random check of parcels with I/L Ratios below 1.0 revealed that most fall under the 'minor improvement' category and are being used for parking. A further analysis of I/L Ratios for parcels in the 'minor improvement' category led us to conclude that there is no cutoff point at which the Ratio changes dramatically. It is actually a linear graph.

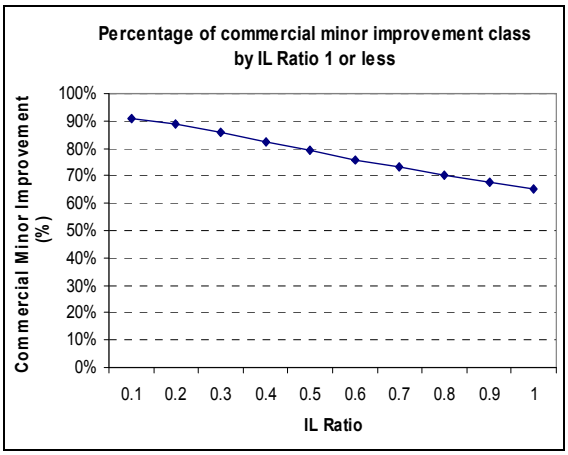

Figure 13. Frequency Distribution of I/L Ratio for Commercial Minor Improvement Class

Based on the examination of I/L Ratio distribution, percentage of commercial 'minor improvement' parcels, and understanding of the nature of commercial land use patterns, we chose 0.5 as the cutoff point for estimating underutilized commercial parcels in Cook county. If commercial parcels have I/L Ratio less than 0.5, it is assumed that they are either utilizing an excessive amount of space for parking or on the verge of abandonment.

Analysis of industrial parcels involves different considerations than commercial uses. As stated above, commercial parcels classified as 'commercial minor improvement' are considered to be refillable because most of them appear to be parking spaces. Industrial lots with little improvements could be used as working space or some industries such as distribution may need larger lots for loading and truck parking. However, it is possible that the space could still be used more efficiently, with shared parking or mixed uses.

Table 7. Amount of 'commercial minor improvement' parcels by I/L Ratio cut-off points

I/LRatio	No. of Commercial Parcels	No. of 'commercial minor improvement' parcels	% with Infill Potential
≤ 0.1	10,990	9,973	91%
≤ 0.2	15,470	13,721	89%
≤ 0.3	17,903	15,350	86%
≤ 0.4	19,674	16,239	83%
≤ 0.5	21,167	16,789	79%
≤ 0.6	22,513	17,103	76%
≤ 0.7	23,781	17,377	73%
≤ 0.8	24,957	17,545	70%
≤ 0.9	26,119	17,688	68%
≤ 1	27,363	17,827	65%

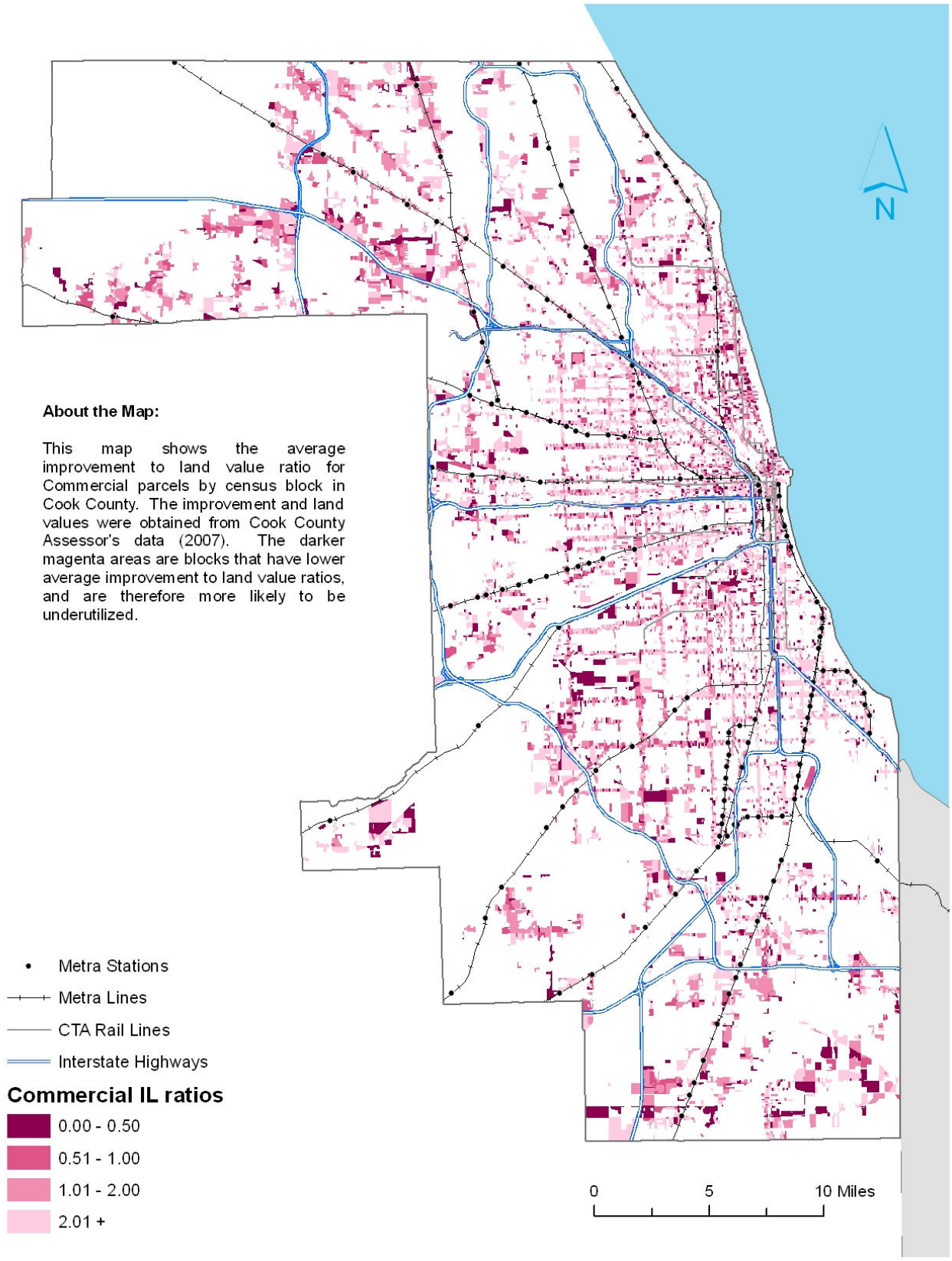

Figure 14. Average I/L Ratio by Census Block: Commercial Use

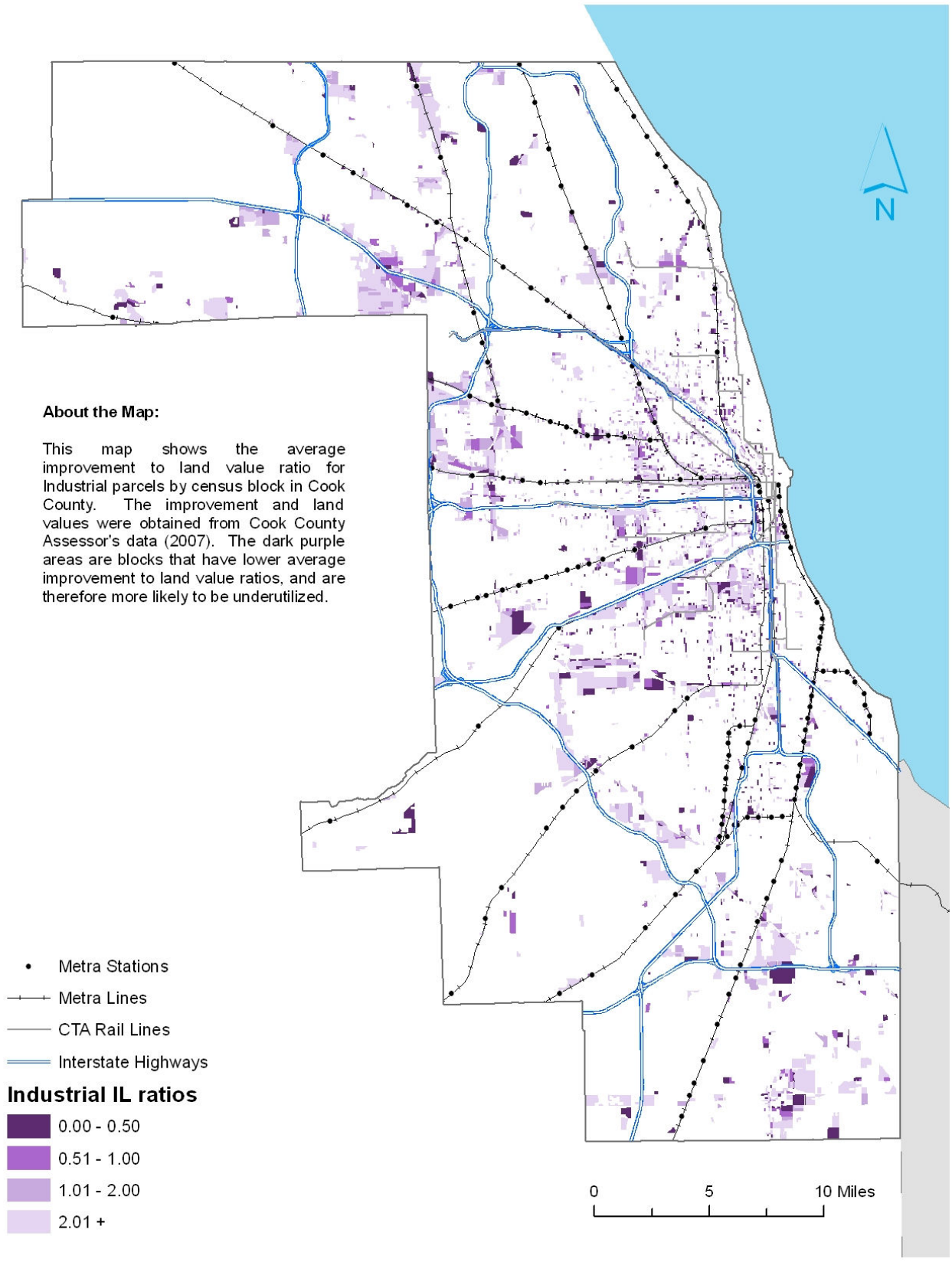

Figure 15. Average I/L Ratio by Census Block: Industrial Use

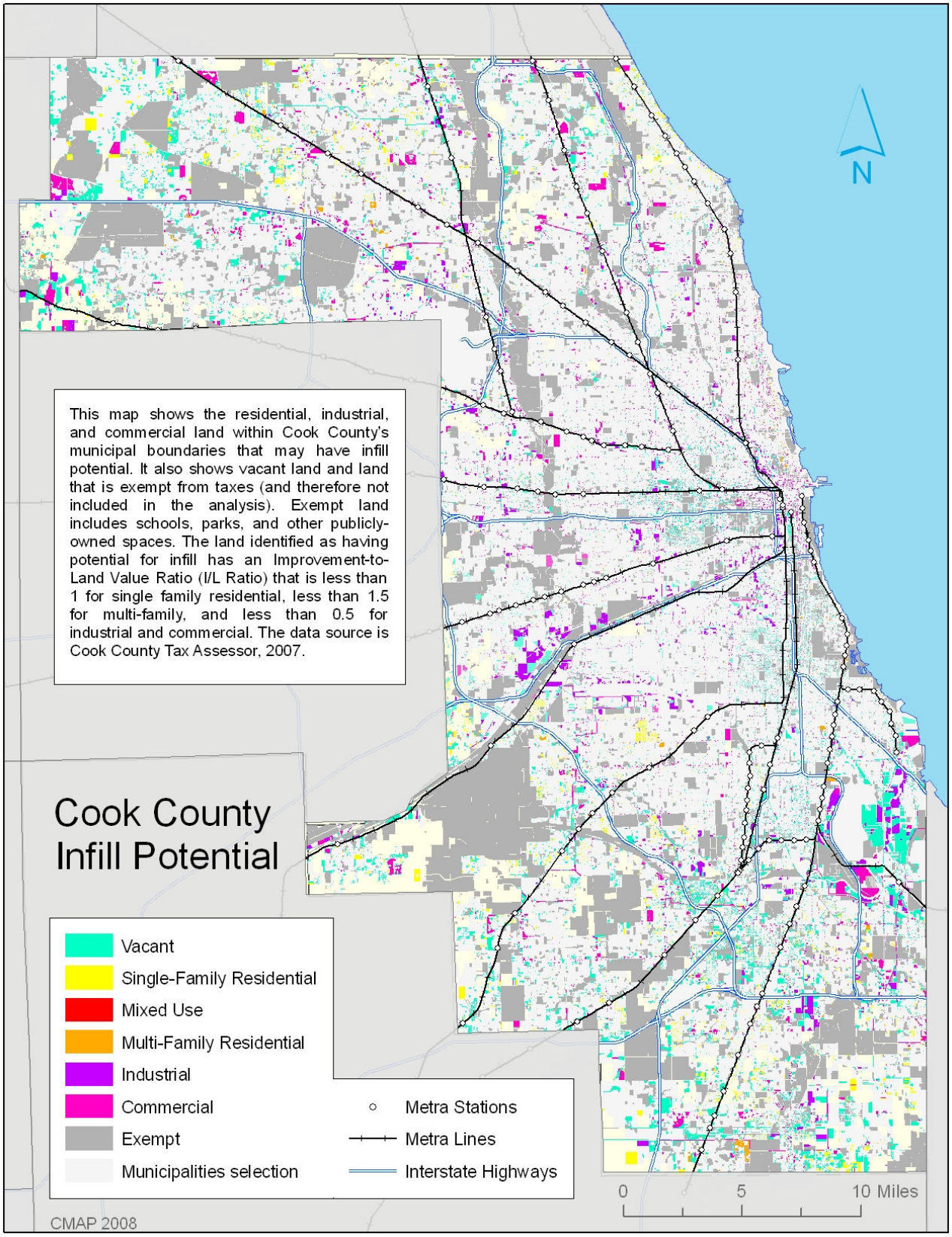

Figure 16. Cook County Infill Potential

7. Analysis Results for DuPage, Kane, Kendall, Lake, McHenry, and Will Counties

After completing the report for Cook County, and determining the best analysis approach, we successfully obtained data from the remaining six counties, herein referred to as the "Collar Counties." The average I/L Ratios for several Collar Counties were much higher than Cook County, and it was determined that there were data errors because some parcels had high-value buildings that were on land that had zero value. These few parcels skewed the results of the average, so we removed all parcels that had IL Ratios greater than 100, and considered them to be outliers. This only removed 0.01% of the parcels. After correcting for the data errors, the I/L Ratios were similar to Cook County's and the analysis used the same cut-off points for each land use.

Table 8. Average I/L Ratios by County and Land Use

County	Single Family Residential	Multi-Family Residential	Commercial	Industrial
Cook	4.14	7.31	2.50	3.55
DuPage	2.49	3.71	1.70	2.68
Kane	4.11	4.67	2.20	2.66
Kendall	4.57	-	2.64	3.83
Lake	3.62	7.93	3.63	3.92
McHenry	4.37	-	2.97	2.95
Will	3.73	-	2.93	2.97
AVERAGE	**3.86**	**5.91**	**2.65**	**3.22**
I/L Ratio Cut-off	1.0	1.5	0.5	0.5

7.1 Data and Results

The parcel data file from DuPage County is older than the other county datasets (2003), and this resulted in the exclusion of slightly less than ten thousand parcels (out of over 280,000 parcels) and we will run further analysis once we obtain updated datasets from the county. This may also explain why DuPage has lower I/L Ratios than the other counties.

Our data model, once linked with the GIS parcel file, calculated the potential underutilization by eliminating the non-infill potential parcels. First the model calculated the I/L Ratio for non-vacant land. Any parcels above the cut-off points were taken out of the mix. Second, it eliminated any parcels less than 2,000 square feet. Then, we excluded any areas overlapping water bodies, and finally we eliminated any parcels that fell outside of municipal boundaries.

The table below (***Table 9***) shows how the underutilized parcel selection process breaks down by county and the series of tables below (***Table 10***) that shows the final acres for each county, by assessed land use. See ***Figure 30*** in the Appendix for a sample model used for Kane County.

Table 9. Underutilized Parcel Selection Process

Underutilized Selection Process		DuPage		Kendall		Kane		Lake		McHenry		Will		Total Parcels	
		#	%	#	%	#	%	#	%	#	%	#	%	#	%
1	Total Parcels from Assesor's File	333,089	100%	52,758	100%	173,623	100%	278,867	100%	138,120	100%	261,320	100%	1,237,777	100%
2	Successfully linked with GIS file	271,792	82%	52,758	100%	170,306	98%	250,781	90%	135,953	98%	261,320	100%	1,142,910	92%
3	Improved & Unimproved lands	39,990	12%	12,757	24%	24,592	14%	53,697	19%	26,167	19%	39,618	15%	196,821	16%
3a	I/L Ratio below cut-off	30,467	9%	436	1%	5,527	3%	7,110	3%	3,911	3%	39,618	15%	87,069	7%
3a	Vacant	9,523	3%	12,321	23%	19,065	11%	46,587	17%	22,256	16%	0	0%	109,752	9%
4	Minimum lot size >= 2000 sq. ft	38,850	12%	12,370	23%	23,375	13%	50,242	18%	24,821	18%	38,043	15%	187,701	15%
5	Inside municipal boundaries	32,110	10%	10,632	20%	16,047	9%	34,712	12%	15,095	11%	28,928	11%	137,524	11%
Total Underutilized Acres		**16,979**	**Acres**	**7,735**	**Acres**	**18,076**	**Acres**	**77,041**	**Acres**	**13,796**	**Acres**	**35,162**	**Acres**	**136,918**	**Acres**

Table 10. Acres with Low I/L Ratios for each County, by assessed land use

DuPage

Commercial	3,430.9 Acres
Industrial	1,266.5 Acres
Multi-Family	584.2 Acres
Single-Family	7,125.2 Acres
Vacant	2,645.1 Acres
Total	15,051.9 Acres

Lake

Commercial	3,701.2 Acres
Industrial	1,189.1 Acres
Multi-Family	64.8 Acres
Single-Family	9,298.8 Acres
Vacant	52,080.3 Acres
Total	66,334.2 Acres

Kane

Commercial	4,452.3 Acres
Industrial	2,459.9 Acres
Multi-Family	215. 3 Acres
Single-Family	916.3 Acres
Vacant	10,032.0 Acres
Total	17860.5 Acres

McHenry

Commercial	2,643.7 Acres
Industrial	1,112.5 Acres
Single-Family	1,030.2 Acres
Vacant	9,038.4 Acres
Total	13,824.8 Acres

Kendall

Commercial	268.9 Acres
Industrial	168.0 Acres
Single-Family	125.1 Acres
Vacant	7,172.9 Acres
Total	7,734.9 Acres

Will

Commercial	7,314.6 Acres
Industrial	9,221.0 Acres
Single-Family	18,699.3 Acres
Total	35,234.9 Acres

7.2 Regional Totals and Conclusions

As the chart below shows, over 180,000 acres regionally within municipal boundaries are vacant or have low I/L ratios. Of these, approximately 100,000 acres are located in sites that are near public transit, near job centers, or in areas of moderate to high density. The remainder, 80,000 acres, is within municipal boundaries but does not have these characteristics. Some of these areas present redevelopment opportunities, while others are on land that has been annexed by municipalities in anticipation of future development.

Table 11. Acreage of Infill Sites by County

County	Total Infill Acres	Infill Sites near transit, job centers, or in denser areas		Infill Sites not near transit, job centers, or in denser areas	
		Acres	%	Acres	%
Cook	55,512	46,935	85%	8,577	15%
DuPage	15,052	13,306	88%	1,746	12%
Kane	18,076	9,084	50%	8,992	50%
Lake	39,941	23,723	59%	16,218	41%
McHenry	13,825	4,774	35%	9,051	65%
Will	35,235	9,897	28%	25,338	72%
Kendall	7,326	1,360	19%	5,966	81%
Total	184,967	109,079	59%	75,888	41%

Additionally, parcels owned by tax-exempt organizations are not included in these totals because they are not assessed. These parcels may include land that has been purchased by a government agency for the purpose of redevelopment, parking lots near municipal buildings or train stations, and others. Redevelopment efforts in these areas should weigh the benefits of redevelopment with the need of local governments and transportation agencies to provide adequate parking at their facilities. The amount of potential infill land in these areas can only be calculated by thorough examination with the help of local governments. Maps on the following pages show the findings from the Collar Counties.

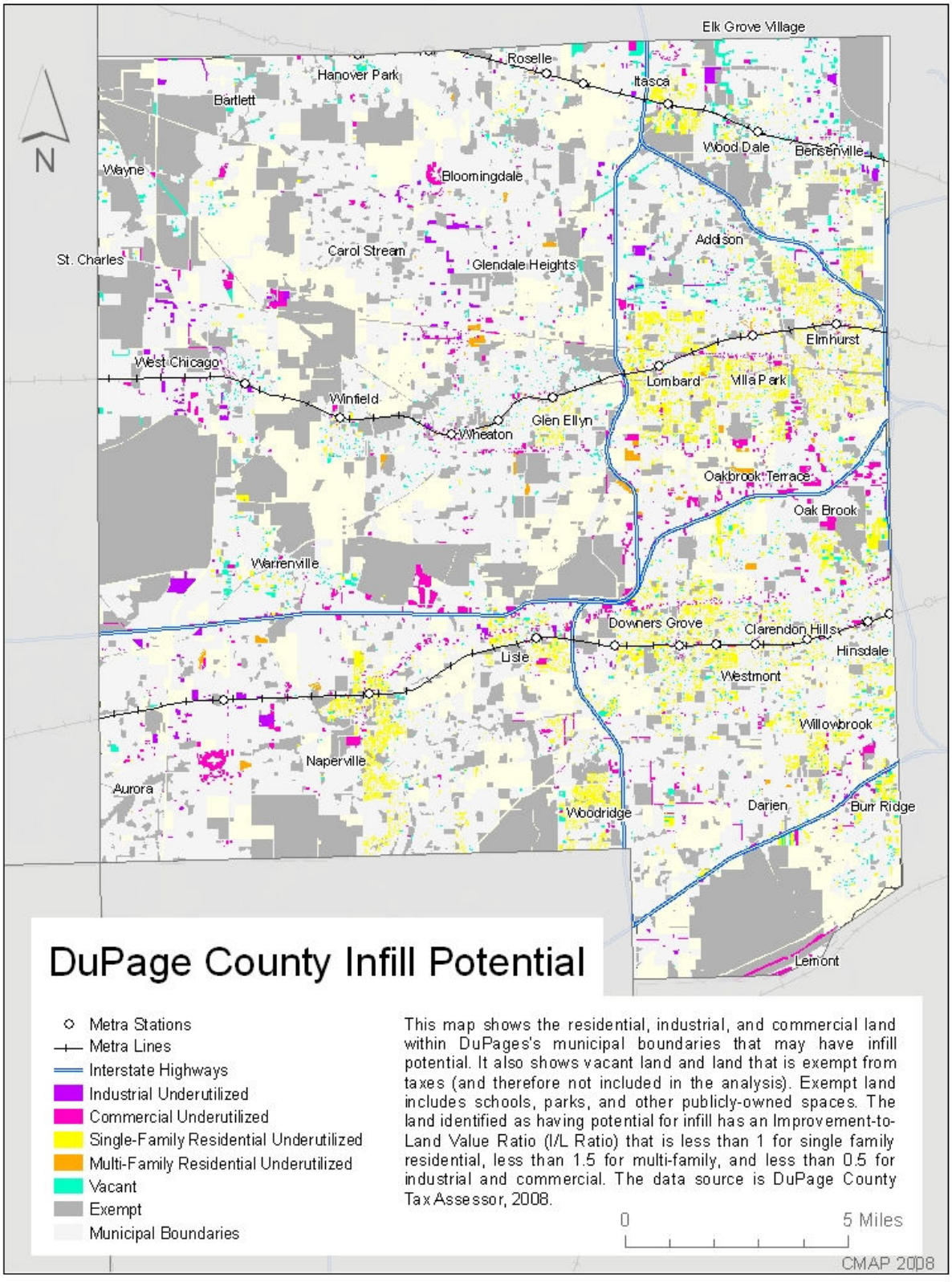

Figure 17. DuPage County Infill Potential

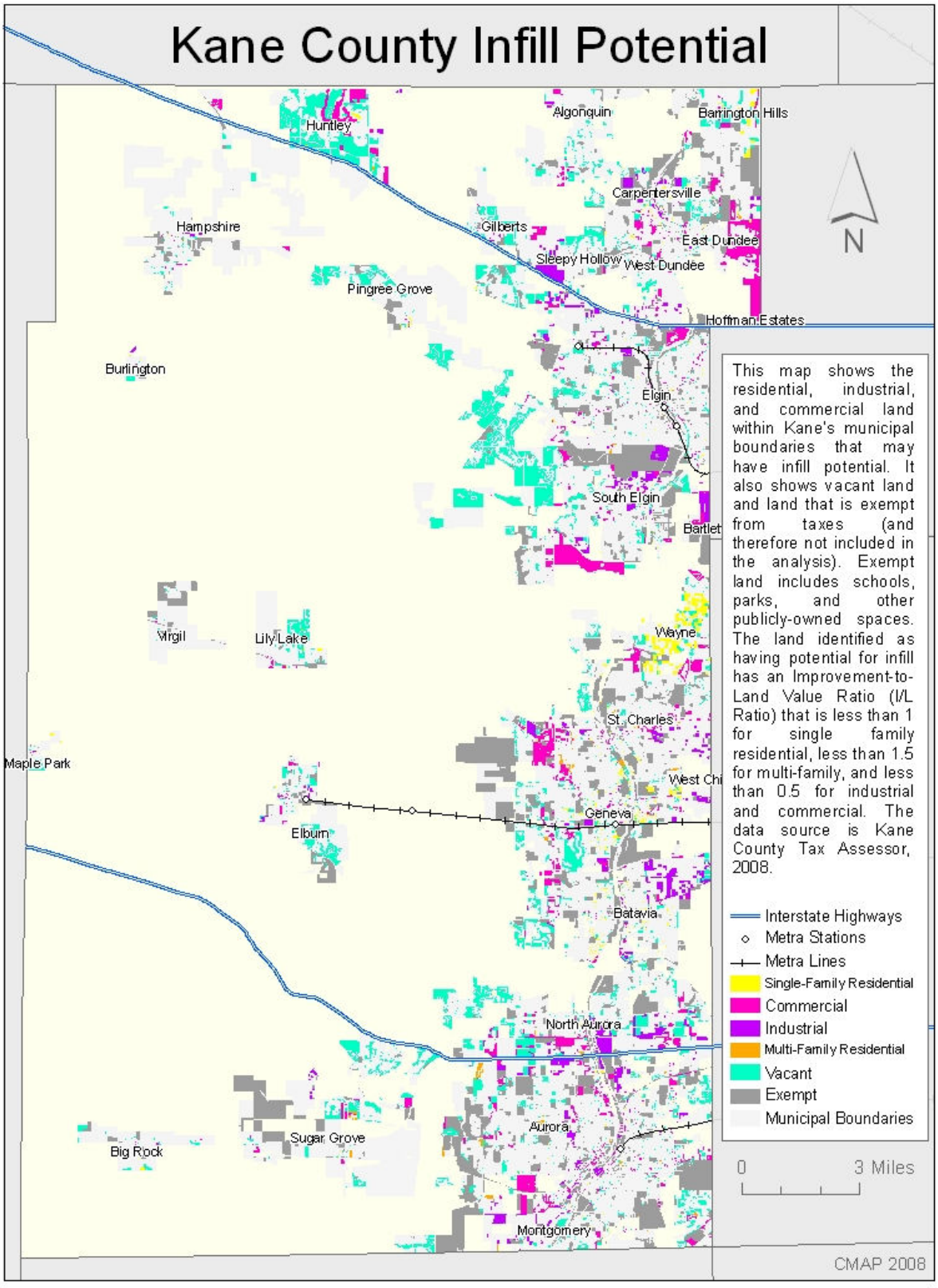

Figure 18. Kane County Infill Potential

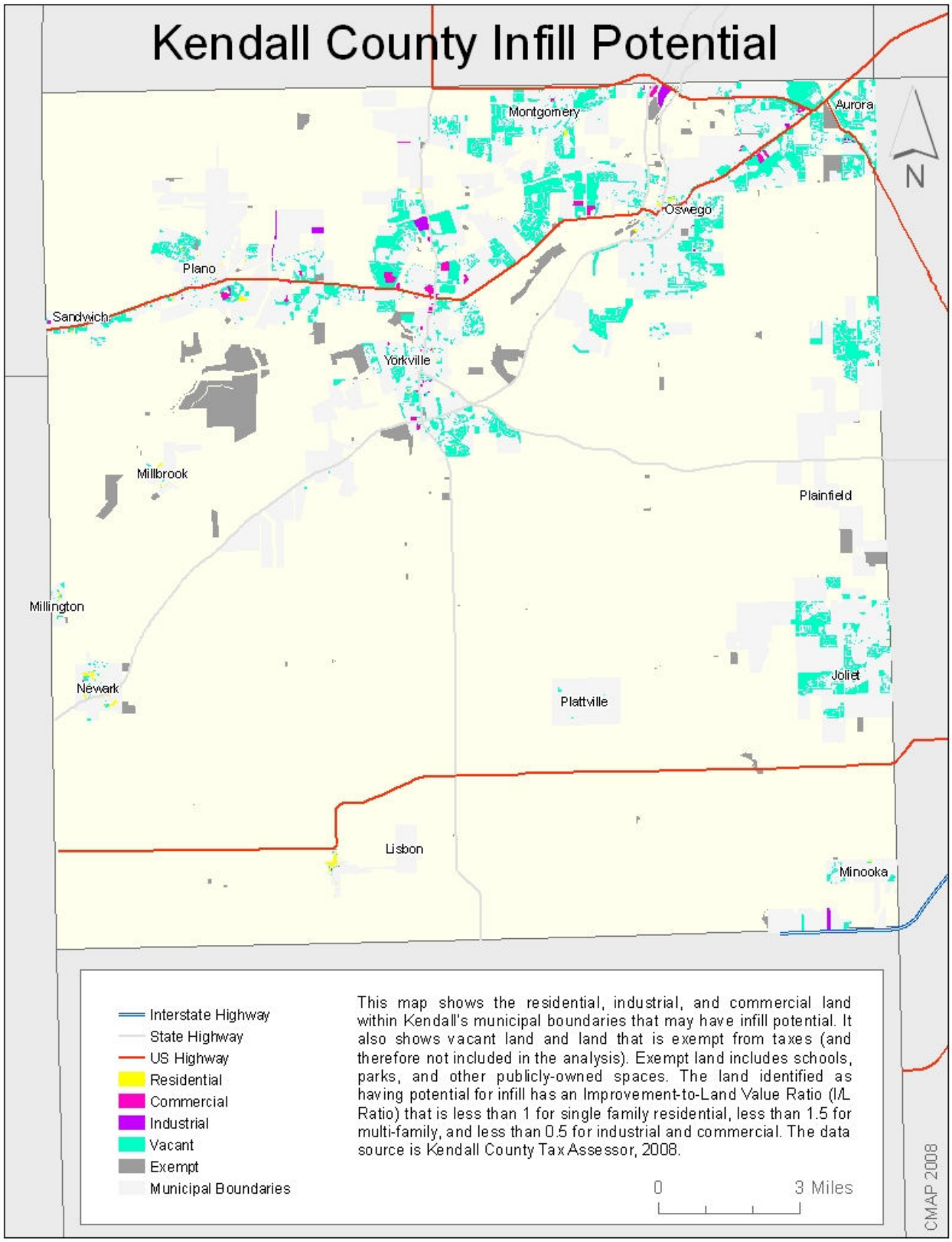

Figure 19. Kendall County Infill Potential

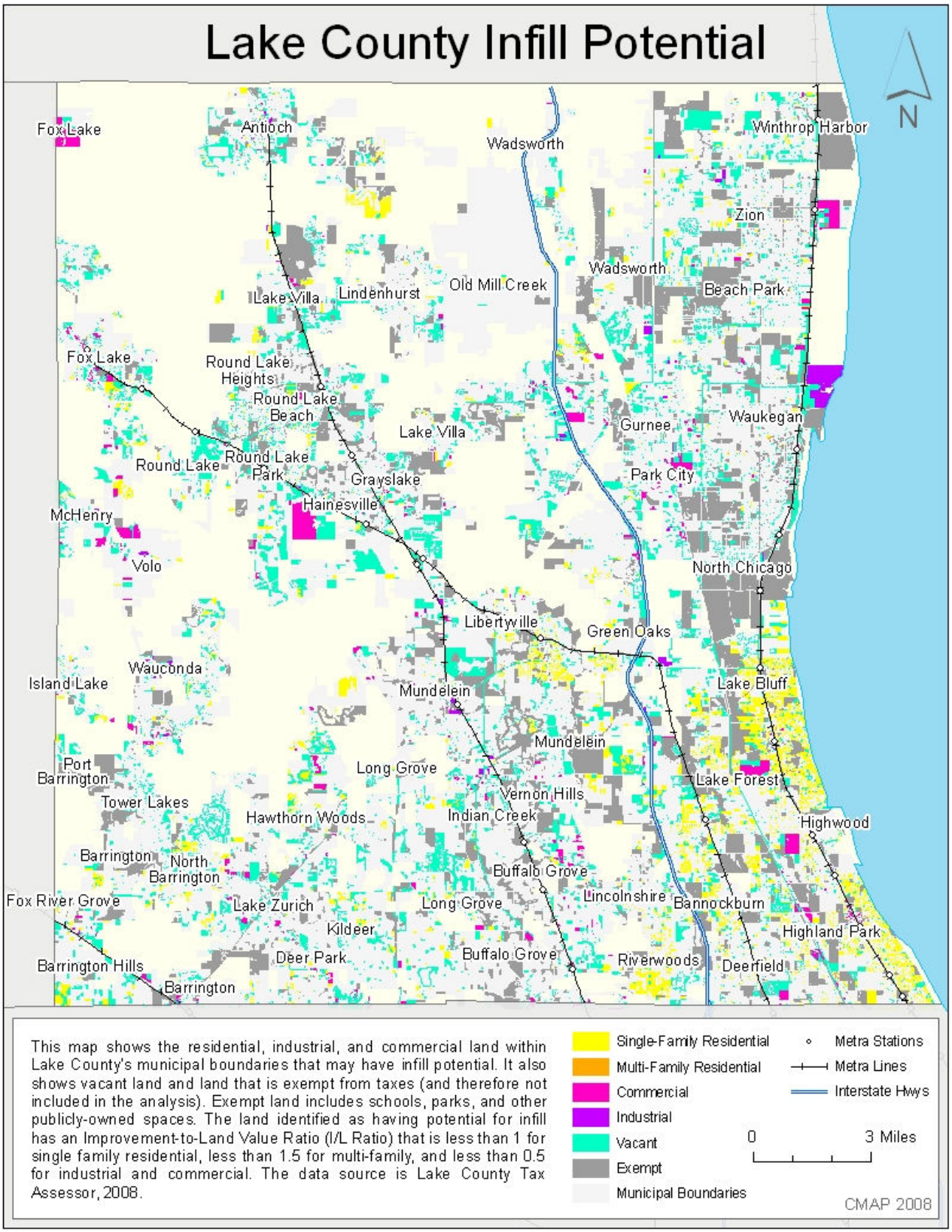

Figure 20. Lake County Infill Potential

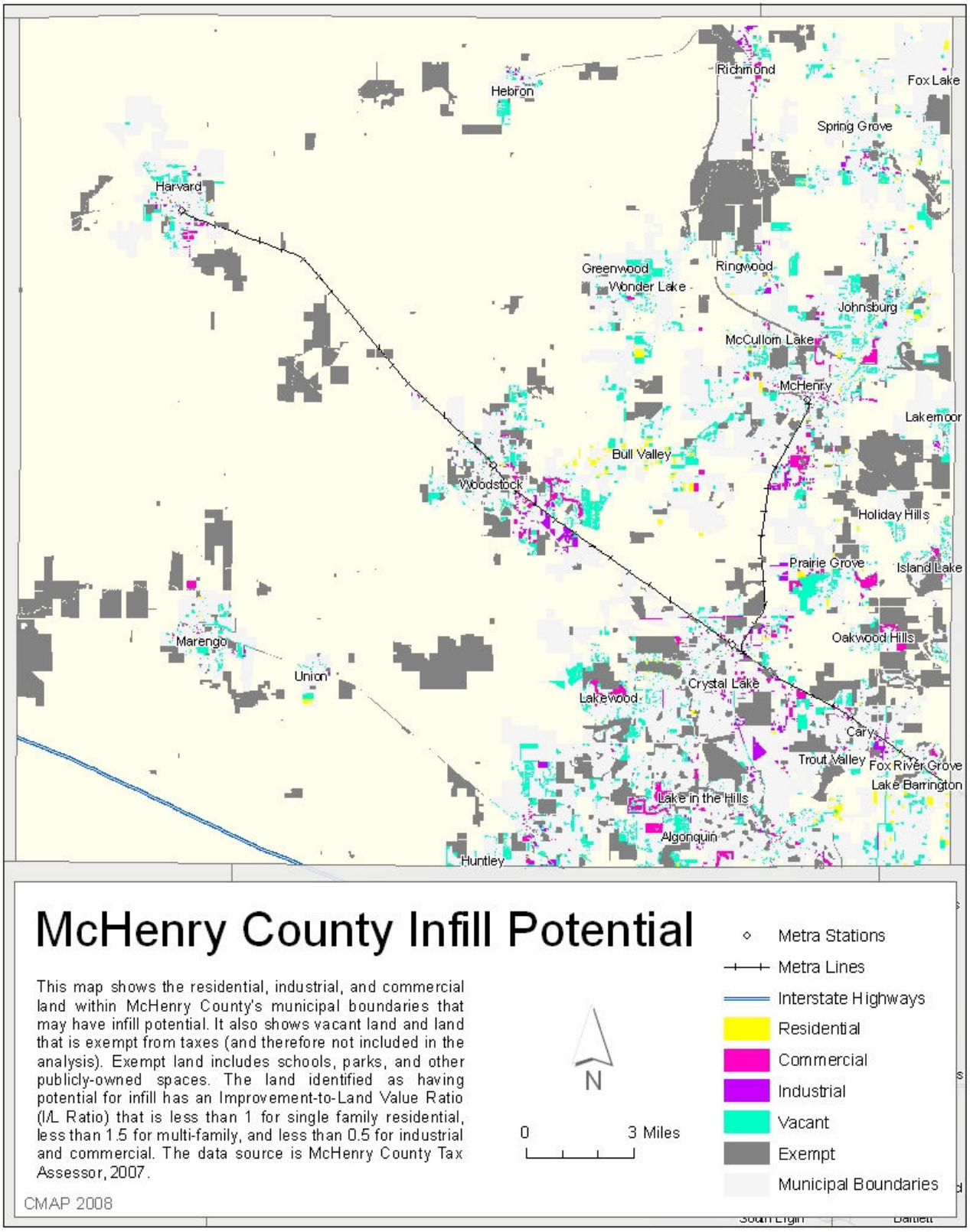

Figure 21. McHenry County Infill Potential

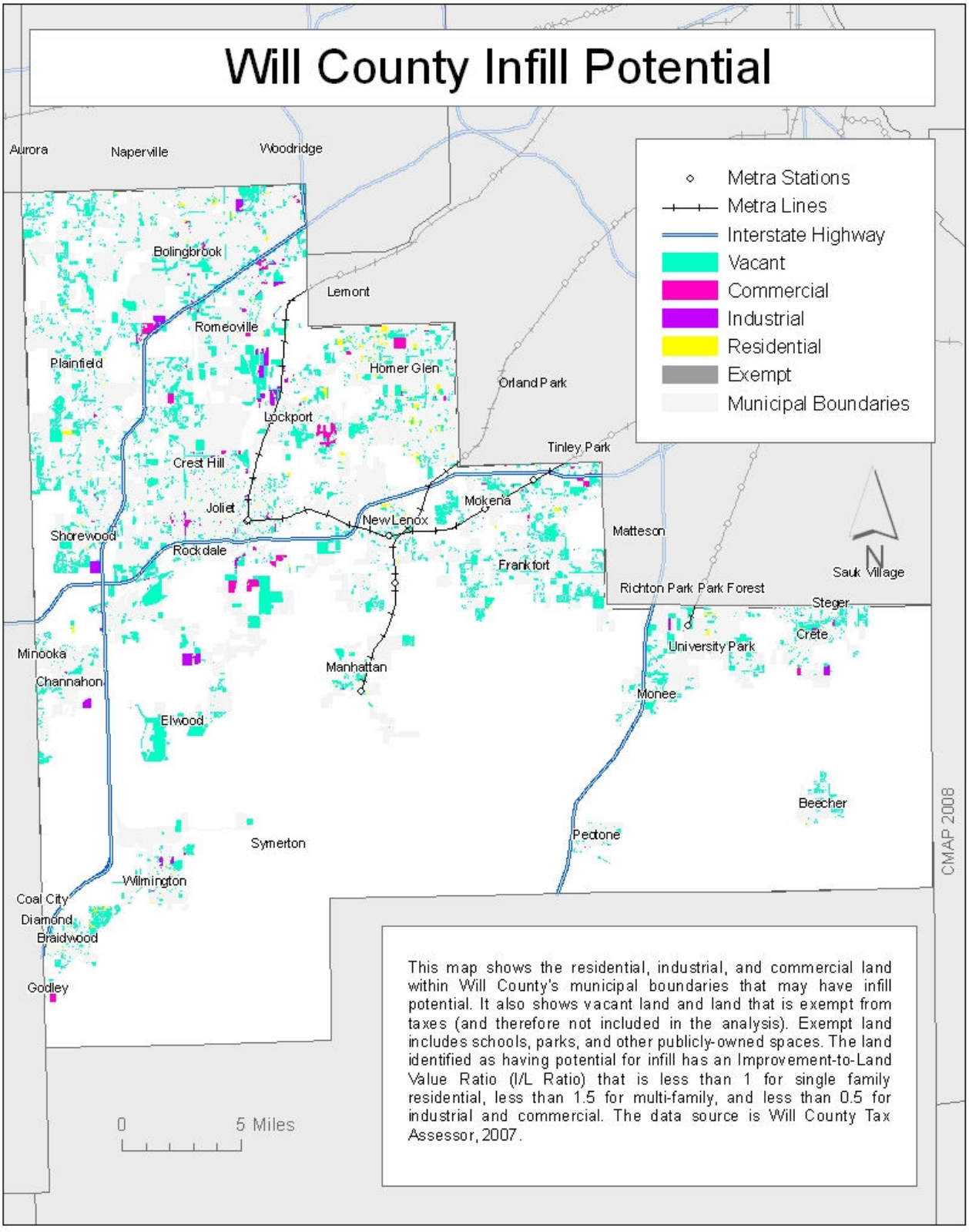

Figure 22. Will County Infill Potential

8. Future Work and Discussion

Substantial challenges stand in the way of the development of many infill sites, and those impediments may vary significantly between municipalities or between multiple sites in a single municipality. While no one-size-fits-all solution exists, the GO TO 2040 plan will recommend a clear course of action for communities to overcome these obstacles and promote infill development.

As the region's population grows over the next thirty years, infill development will become increasingly important to maximize the efficient use of land and infrastructure. For example, Cook County is projected to add approximately 223,000 additional households by 2030. Cook County's vacant land alone can accommodate 101,141 new housing units if developed at the current level of density as the municipality they are located in. While it is important to maintain community character when completing infill projects, the density would most likely be increased in target infill areas, having the potential to accommodate many more housing units and employment centers, and lessening the need for, and impact of, development at the fringe.

8.1 Understanding local challenges and opportunities

CMAP needs to understand the different opportunities and constraints that each part of the region faces in addressing infill. Therefore, the agency will hold a series of workshops with municipalities and counties in 2008-09 to discuss the initial findings of this Regional Snapshot report and the prospects for infill development in each community. These conversations should cover likely sites for infill, market pressures that may affect the pattern of development, infrastructure capacity, and challenges or constraints to infill development that must be overcome. The results of these meetings will be used as part of CMAP's process for forecasting future population and employment.

CMAP also has a variety of planning tools that can be used to facilitate discussions of infill potential. The agency's Centers Toolkit can be used by local officials, planners, developers, and residents to help identify important characteristics of communities and choose the most appropriate planning strategies.

In addition to understanding local conditions, CMAP will ensure that the GO TO 2040 plan is grounded in thorough research of different options available to address challenges related to infill development and other planning strategies. Visit http://www.goto2040.org/strategy_papers.aspx for a series of new CMAP strategy research papers. These reports are posted in interactive format that encourages comments from CMAP's stakeholders and the general public. In the examples below, italicized words indicate that a strategy report on this issue has been posted on this website or is expected to be posted in spring 2008.

For example, that website has a strategy report on *teardowns*, which are identified in this report as an important issue. Depending on local conditions, these may signify that higher-density development would be beneficial, or they may indicate to communities that need housing preservation strategies to preserve the existing affordable housing stock. Alternatively, *inclusionary zoning* programs can help to ensure that if infill sites are used for housing development, they include housing to meet the needs of the local workforce.

In other areas, *brownfields* can present serious challenges for development if potential infill sites have been environmentally damaged by previous uses. Some communities may see potential infill sites as excellent opportunities to increase access to *parks and open space* by planning new facilities here, while other communities will favor job creation. Many of the parcels identified in this analysis are surface parking lots, which could be used more efficiently through a variety of parking strategies. In all infill sites, the application

of *urban design* techniques is encouraged to create walkable communities. CMAP's understanding of the strategies identified above can be greatly increased through the comments of our stakeholders, and we encourage readers of this report to visit the above website and contribute to the online discussions.

8.2 Prioritize Infill Parcels

In order for land to be considered for infill development, it must meet certain criteria. While the types of development may differ from one municipality to the next, all communities in the region have opportunities to develop vacant and underutilized lots and create more livable and sustainable communities.

The foundation for successful infill is built upon a mix of uses, density, walkable streets, and proximity to transit (Northeast-Midwest Institute & CNU 2001). There is a symbiotic relationship between each of these factors, and each community can pursue them differently. "Existing infrastructure, proximity to employment, and access to transit are among factors that make communities attractive to developers, businesses and residents" (Iams and Kaplan 2006). These are the first evaluation criteria established for infill site prioritization.

8.2.1 Urban Footprint

One purpose of promoting infill development is to use land more efficiently, and Chicago has not yet delineated an urban footprint as other major metropolitan areas have. Nonetheless, it is necessary to distinguish between land that has potential for infill development and land that is suitable for another type of development, but not infill development. For lack of a more distinct border, specifications need to be established. For the purpose of this study, land that is currently covered by municipal services (water, sewer, phone lines, trash collection, etc.) and within the incorporated boundaries of a municipality is considered to be within the urban footprint. Unincorporated land will not be considered for infill development, because this was the easiest way to eliminate potential greenfield development. CMAP recognizes that some populated places currently lie outside of municipal boundaries and may have infill potential; these cases will have to be examined individually.

Another way to prioritize areas that are already populated is to examine the population density. For the map of composite infill (***Figure 23***), we selected parcels that were in census blocks with 2.5 housing units per acre or more.

8.2.2 Proximity to Transit Options

Infill development located within a short distance from transit options is essential to redevelopment in urban cores. While parcels close to transit are preferable, the lack of existing transit should not preclude infill development because increased density resulting from new development can create a demand for transit.

There are general standards for the density levels required for different transit options. For a regular, on-street bus service the minimum is 6 to 8 units per acre for a transit corridor. For express bus service with exclusively pedestrian access (i.e. no park-and-ride facilities), the minimum density along a corridor is 15 units per acre (CRCG 2002). These statistics should be considered when planning for transit-oriented development. For this study (***Figure 23***), parcels considered to be "near transit" are either within one mile of a Metra station, within a half mile from a CTA station, or within a half mile from "key" CTA bus lines or Pace bus lines that serve over 1,000 passengers daily.

8.2.3 Proximity to Employment Centers

Research has shown that in downtown areas, a minimum density of 50 employees per acre is needed to support regular transit service (CRCG 2002). CMAP has a Regional Snapshot Report underway that will

analyze the region's Jobs-Housing Balance. A combination of findings could help to identify priority infill locations. For this study (***Figure 23***), parcels located within one mile of a job center having at least 1,500 jobs were considered to be "near employment centers."

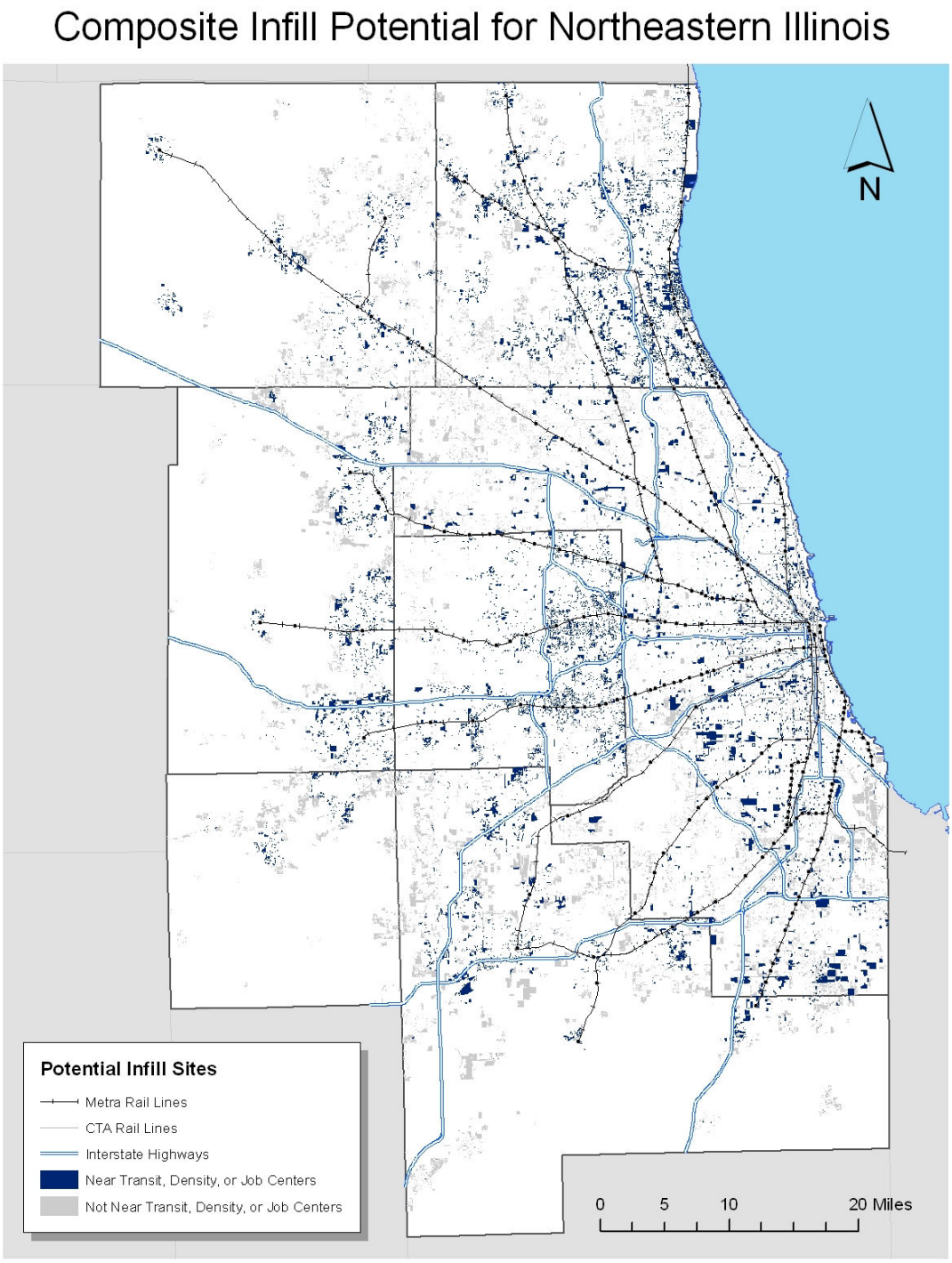

Figure 23. Composite Infill Potential for Northeastern Illinois

8.2.4 Smart Urban Design

Walkable streets and small parcels, with a broad range of uses, have proven essential to creating compact, livable communities (Appleyard & Moore). Investments in the pedestrian experience, in conjunction with transit investment, can also help to create vibrant communities. There are many elements of successful urban design strategies for infill and this topic will be explored by CMAP staff and summarized in an upcoming strategy paper.

8.2.5 Neighborhood Revitalization

Suburban expansion and greenfield development since the 1950s has left urban cores suffering as the strong tax base began to diminish. Large pockets of vacant and abandoned properties characterize many large urban areas in the US. These locations typically have easy access to transportation options and employment centers—making them prime infill development spots. While infill can be used to bring these neighborhoods back to life, there are considerations and steps that must be taken to address the needs of the residents that currently live there. One Chicago resident did that by creating a program to turn vacant lots into community gardens, providing access to quality fruits and vegetables that her neighborhood was previously lacking (Redmond 2004). It will be important to identify the most pressing needs of the community and to design development to satisfy those needs while preserving community character.

8.2.6 Open Space and Habitat Connectivity

When considering infill development, it will be necessary to work with Chicago Wilderness's Green Infrastructure Vision to maintain and enhance any green infrastructure corridors. Improving habitat connectivity is a priority for CMAP and the region. See ***Figure 27***.

8.2.6 Identifying Potential Teardown Risk Sites

Parcels identified as infill potential were selected as being at risk of teardowns if several criteria existed, including:

- Parcels classified as single family, or 6 units or less for McHenry and Kane
- Improved value is in the top 80th percentile of all single family parcels identified as potential infill (by county)
- Parcel size is less than one acre

The following table shows the results for each county:

County	Number of parcels	Acres
Cook	6,331	2,308
Dupage	17,414	4,902
Kane	514	171
Kendall	70	23
Lake	7,125	2,413
McHenry	392	110
Will	725	49

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Appendix

This report began with a limited amount of data; we only had tax assessor data and parcels GIS files for Cook County. We began a series of analyses with this data and then did not continue with the Collar Counties because of the unique findings in each county. We would prefer an approach to the infill solution that better incorporates the needs and challenges that vary from one community to another.

To better understand the capacity of land that has been identified in this report as infill potential, various analyses were completed for Cook County using current levels of household density in each municipality. Dividing the data by municipality helps to understand the regional distribution of available vacant land and varying density levels. ***Table 12*** and ***Figure 24*** show the number of households that can be accommodated on vacant land in each Cook County municipality if all parcels were developed with housing units similar to the municipalities' existing housing units. The density levels were calculated after subtracting the vacant acres. The number of households and housing units listed are not recommendations for development; they are solely to provide a visual understanding of the existing conditions. ***Table 13*** and ***Figure 25*** show the percentage of land that would be needed to maintain current density levels, while accommodating the predicted population growth through 2030. ***Table 13*** also shows how much land would be needed if density levels were increased to 125% and 150% of current density levels. In order for communities to be able to accommodate more of the region's projected population increase, density will need to increase.[1]

Table 12. Number of additional housing units that could fit on vacant parcels at current density

Municipality	Housing units	Municipality	Housing units	Municipality	Housing units
Alsip	442	Glenwood	81	Orland Park	1,883
Arlington Heights	647	Golf	0	Palatine	1,596
Barrington*	431	Hanover Park*	199	Palos Heights	249
Barrington Hills*	38	Harvey	1,074	Palos Hills	391
Bartlett*	705	Harwood Heights	10	Palos Park	204
Bedford Park	11	Hazel Crest	368	Park Forest*	218
Bellwood	87	Hickory Hills	186	Park Ridge	94
Bensenville*	0	Hillside	697	Phoenix	92
Berkeley	24	Hinsdale*	57	Posen	234
Berwyn	94	Hodgkins	20	Prospect Heights	160
Blue Island	723	Hoffman Estates	1,371	Richton Park	643
Bridgeview	373	Hometown	4	River Forest	14
Broadview	25	Homewood	251	River Grove	13
Brookfield	67	Indian Head Park	202	Riverdale	302
Buffalo Grove*	34	Inverness	101	Riverside	11
Burbank	77	Justice	97	Robbins	592
Burnham	206	Kenilworth	6	Rolling Meadows	165
Burr Ridge*	128	La Grange	74	Roselle*	339
Calumet City	956	La Grange Park	144	Rosemont	126
Calumet Park	228	Lansing	755	Sauk Village	415
Chicago	61,081	Lemont	1,541	Schaumburg	1,350

[1] Cities that are not mostly in Cook County have been excluded.

Chicago Heights	1,551	Lincolnwood	91	Schiller Park	205
Chicago Ridge	226	Lynwood	174	Skokie	386
Cicero	762	Lyons	93	South Barrington	155
Country Club Hills	427	Markham	441	South Holland	435
Countryside	176	Matteson	974	Steger*	189
Crestwood	292	Maywood	190	Stickney	30
Deerfield*	6	McCook	22	Stone Park	31
Des Plaines	948	Melrose Park	219	Streamwood	832
Dixmoor	140	Merrionette Park	5	Summit	268
Dolton	548	Midlothian	236	Thornton	240
East Hazel Crest	13	Morton Grove	103	Tinley Park	1,515
Elgin*	1,131	Mount Prospect	546	University Park*	0
Elk Grove Village	487	Niles	236	Westchester	103
Elmhurst*	0	Norridge	24	Western Springs	39
Elmwood Park	23	North Riverside	6	Wheeling	797
Evanston	199	Northbrook	414	Willow Springs	151
Evergreen Park	64	Northfield	177	Wilmette	52
Flossmoor	202	Northlake	39	Winnetka	24
Ford Heights	128	Oak Brook*	0	Worth	64
Forest Park	42	Oak Forest	443		
Forest View	20	Oak Lawn	188		
Franklin Park	149	Oak Park	28	*Municipality is partially in Cook County	
Glencoe	24	Olympia Fields	161		
Glenview	402	Orland Hills	153		

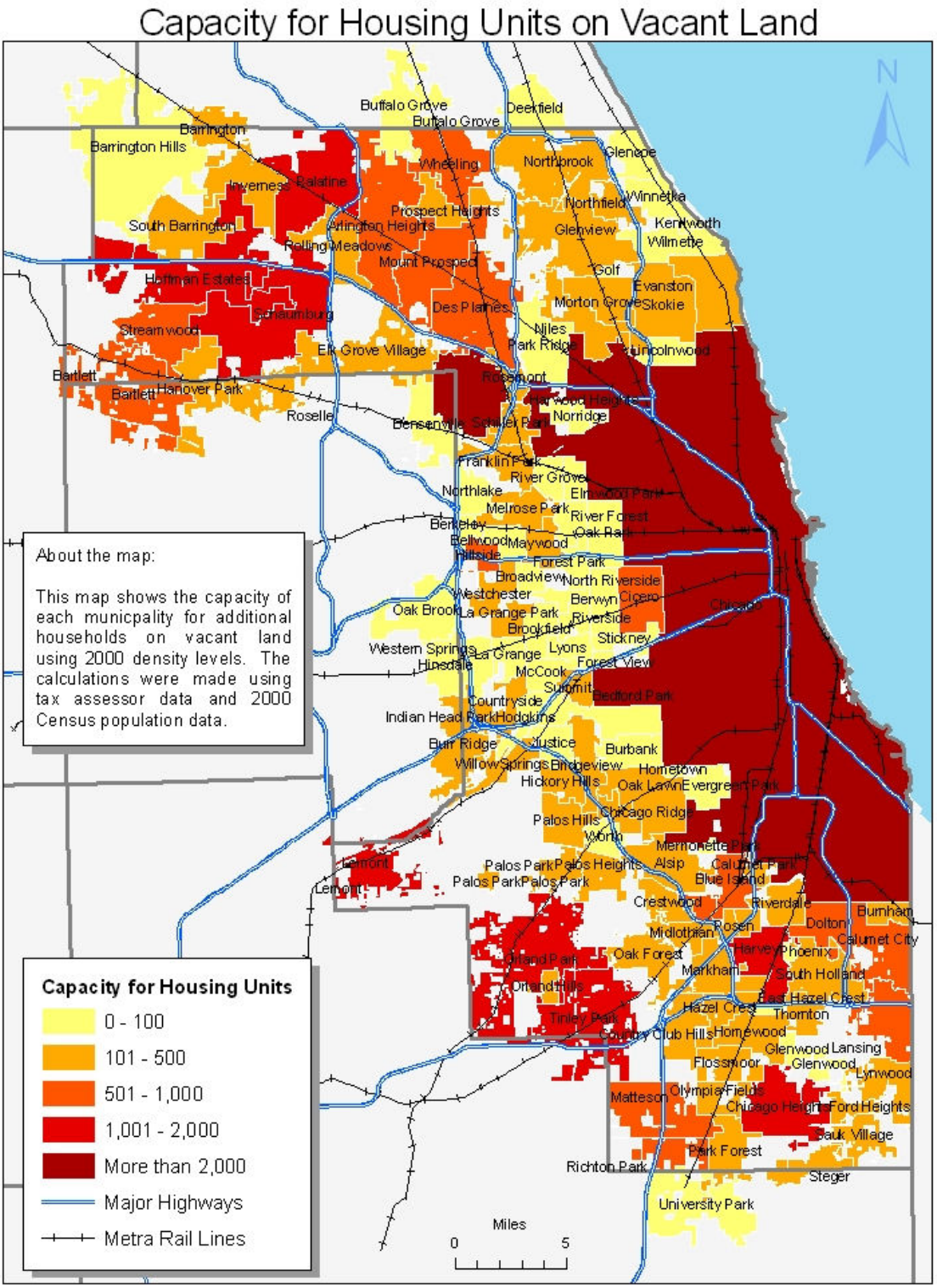


Figure 24. Estimated Capacity for Housing Units on Vacant Land

Table 13. Percentage of Land Needed to Meet Demand for Additional Housing at varying density levels

Percent of Land Needed to Meet Demand				Percent of Land Needed to Meet Demand				Percent of Land Needed to Meet Demand			
Municipality	**Current Density**	**125% of Current**	**150% of Current**	**Municipality**	**Current Density**	**125% of Current**	**150% of Current**	**Municipality**	**Current Density**	**125% of Current**	**150% of Current**
Alsip	110%	88%	73%	Harwood Heights	97%	78%	65%	Orland Park	135%	108%	90%
Arlington Heights	105%	84%	70%	Hazel Crest	103%	83%	69%	Palatine	110%	88%	73%
Bedford Park	95%	76%	63%	Hickory Hills	100%	80%	67%	Palos Heights	111%	89%	74%
Bellwood	103%	82%	69%	Hillside	100%	80%	67%	Palos Hills	98%	78%	65%
Berkeley	100%	80%	66%	Hodgkins	107%	85%	71%	Palos Park	174%	140%	116%
Berwyn	96%	77%	64%	Hoffman Estates	118%	94%	79%	Park Forest	127%	101%	84%
Blue Island	104%	83%	69%	Hometown	99%	80%	66%	Park Ridge	101%	81%	67%
Bridgeview	97%	78%	65%	Homewood	100%	80%	67%	Phoenix	112%	90%	75%
Broadview	98%	78%	65%	Indian Head Park	97%	77%	65%	Posen	126%	101%	84%
Brookfield	97%	78%	65%	Inverness	118%	95%	79%	Prospect Heights	99%	79%	66%
Burbank	98%	79%	66%	Justice	125%	100%	83%	Richton Park	327%	262%	218%
Burnham	104%	83%	69%	Kenilworth	99%	79%	66%	River Forest	97%	77%	65%
Calumet City	104%	84%	70%	La Grange	120%	96%	80%	River Grove	99%	79%	66%
Calumet Park	102%	82%	68%	La Grange Park	106%	85%	71%	Riverdale	105%	84%	70%
Chicago	106%	85%	71%	Lansing	108%	86%	72%	Riverside	99%	79%	66%
Chicago Heights	112%	89%	74%	Lemont	219%	175%	146%	Robbins	105%	84%	70%
Chicago Ridge	97%	78%	65%	Lincolnwood	103%	82%	68%	Rolling Meadows	113%	90%	75%
Cicero	94%	75%	63%	Lynwood	193%	155%	129%	Rosemont	98%	78%	65%
Country Club Hills	117%	94%	78%	Lyons	96%	77%	64%	Sauk Village	188%	151%	126%
Countryside	100%	80%	66%	Markham	114%	91%	76%	Schaumburg	101%	81%	68%
Crestwood	101%	80%	67%	Matteson	271%	217%	181%	Schiller Park	106%	85%	71%
Des Plaines	103%	83%	69%	Maywood	96%	77%	64%	Skokie	99%	79%	66%
Dixmoor	103%	82%	68%	McCook	100%	80%	67%	South Barrington	129%	103%	86%
Dolton	101%	81%	68%	Melrose Park	100%	80%	67%	South Holland	107%	86%	72%
East Hazel Crest	100%	80%	67%	Merrionette Park	104%	83%	69%	Stickney	102%	81%	68%
Elk Grove Village	104%	83%	69%	Midlothian	110%	88%	73%	Stone Park	97%	78%	65%
Elmwood Park	100%	80%	67%	Morton Grove	134%	107%	89%	Streamwood	111%	89%	74%
Evanston	100%	80%	67%	Mount Prospect	104%	83%	69%	Summit	98%	78%	65%
Evergreen Park	100%	80%	67%	Niles	101%	80%	67%	Thornton	100%	80%	67%
Flossmoor	103%	83%	69%	Norridge	98%	79%	66%	Tinley Park	139%	111%	93%
Ford Heights	180%	144%	120%	North Riverside	99%	79%	66%	Westchester	103%	82%	68%
Forest Park	103%	83%	69%	Northbrook	119%	95%	79%	Western Springs	100%	80%	66%
Forest View	99%	79%	66%	Northfield	99%	79%	66%	Wheeling	125%	100%	84%
Franklin Park	114%	91%	76%	Northlake	98%	78%	65%	Willow Springs	220%	176%	147%
Glencoe	98%	78%	65%	Oak Forest	116%	93%	78%	Wilmette	105%	84%	70%
Glenview	132%	106%	88%	Oak Lawn	97%	78%	65%	Winnetka	98%	79%	65%
Glenwood	122%	98%	81%	Oak Park	97%	78%	65%	Worth	99%	79%	66%
Golf	101%	80%	67%	Olympia Fields	138%	111%	92%				
Harvey	100%	80%	66%	Orland Hills	109%	87%	73%				

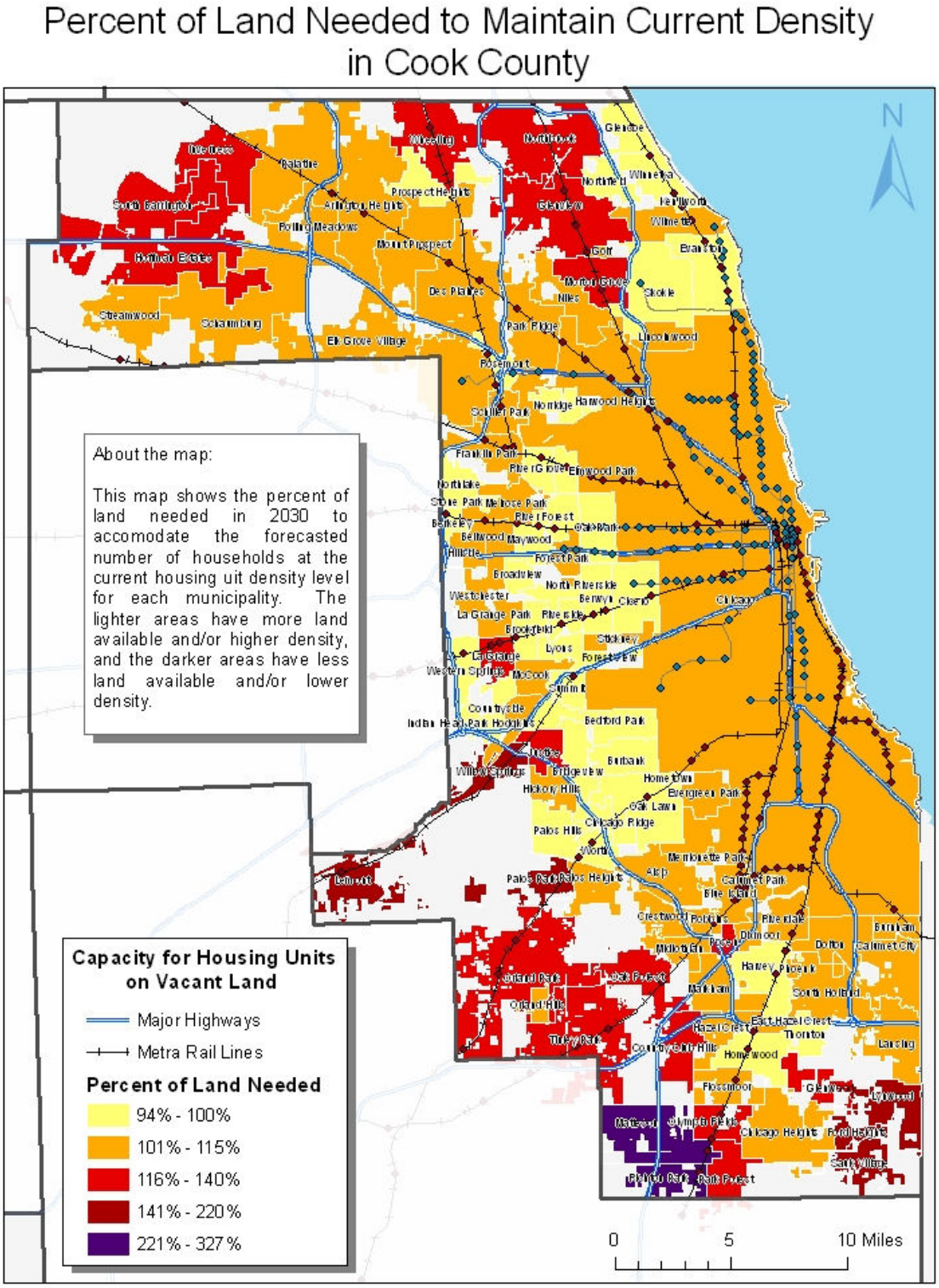


Figure 25. Percent of Land Needed to Maintain Current Density for 2030

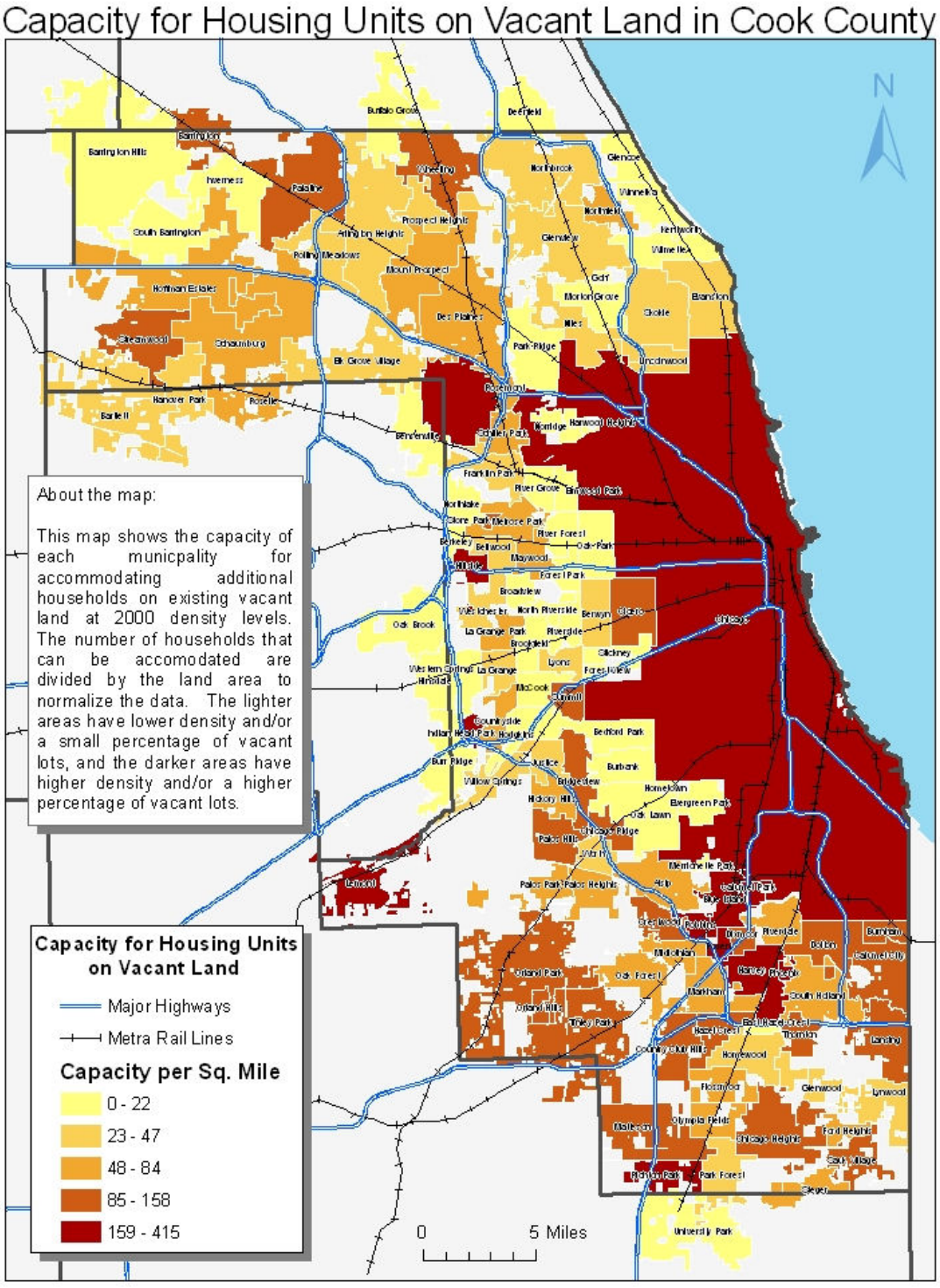
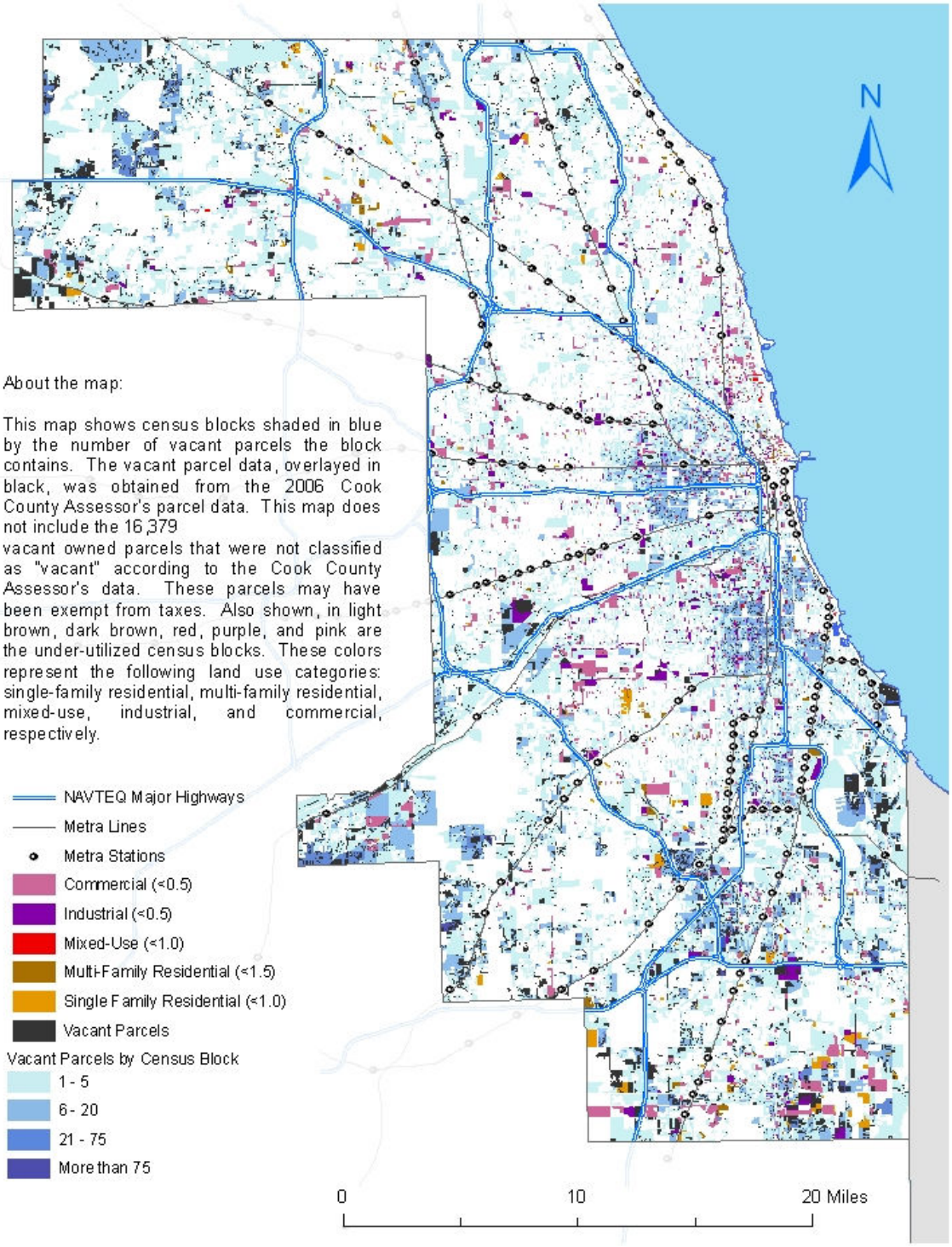


Figure 26. Infill Capacity by Municipality (Cook County)

Vacant and Under-Utilized Land in Cook County



The aerial images that follow are examples of land identified as potentially underutilized by the I/L Ratio (**Figure 28** and **Figure 29**). It appears as though the majority of identified blocks with underutilized parcels contain large parking lots that do not add to the value of the land and could be developed with other uses and creative parking management. Some identified underutilized industrial parcels may not have the same flexibility for redevelopment as commercial parcels because of their unique needs for shipping and packaging. Other parcels identified as underutilized, such as a water treatment facility, might not be underutilized. The built structures do not add much value to the land, but it is a necessary use and not much else can be done with the land.

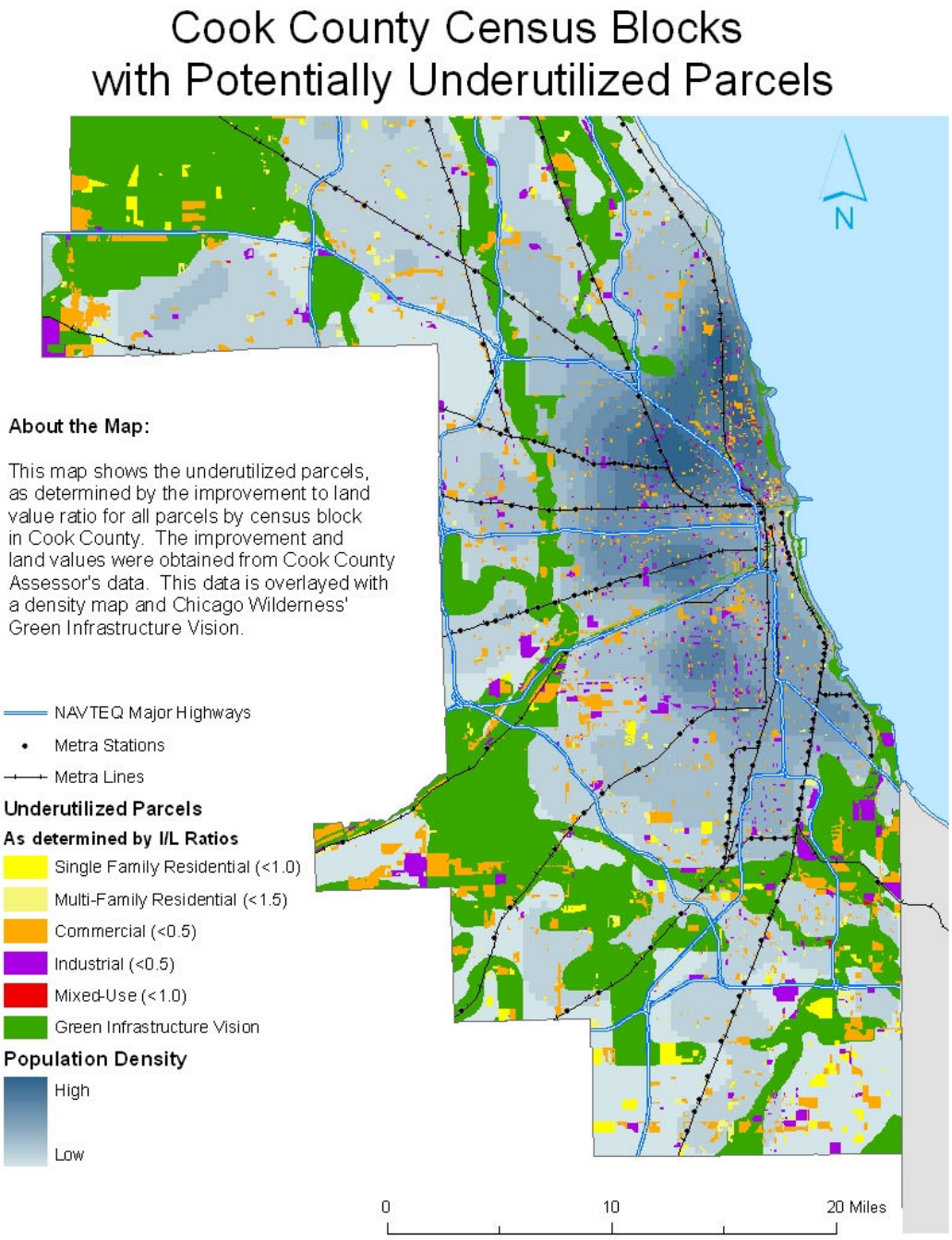


Figure 27. Potentially Underutilized Blocks with Green Infrastructure

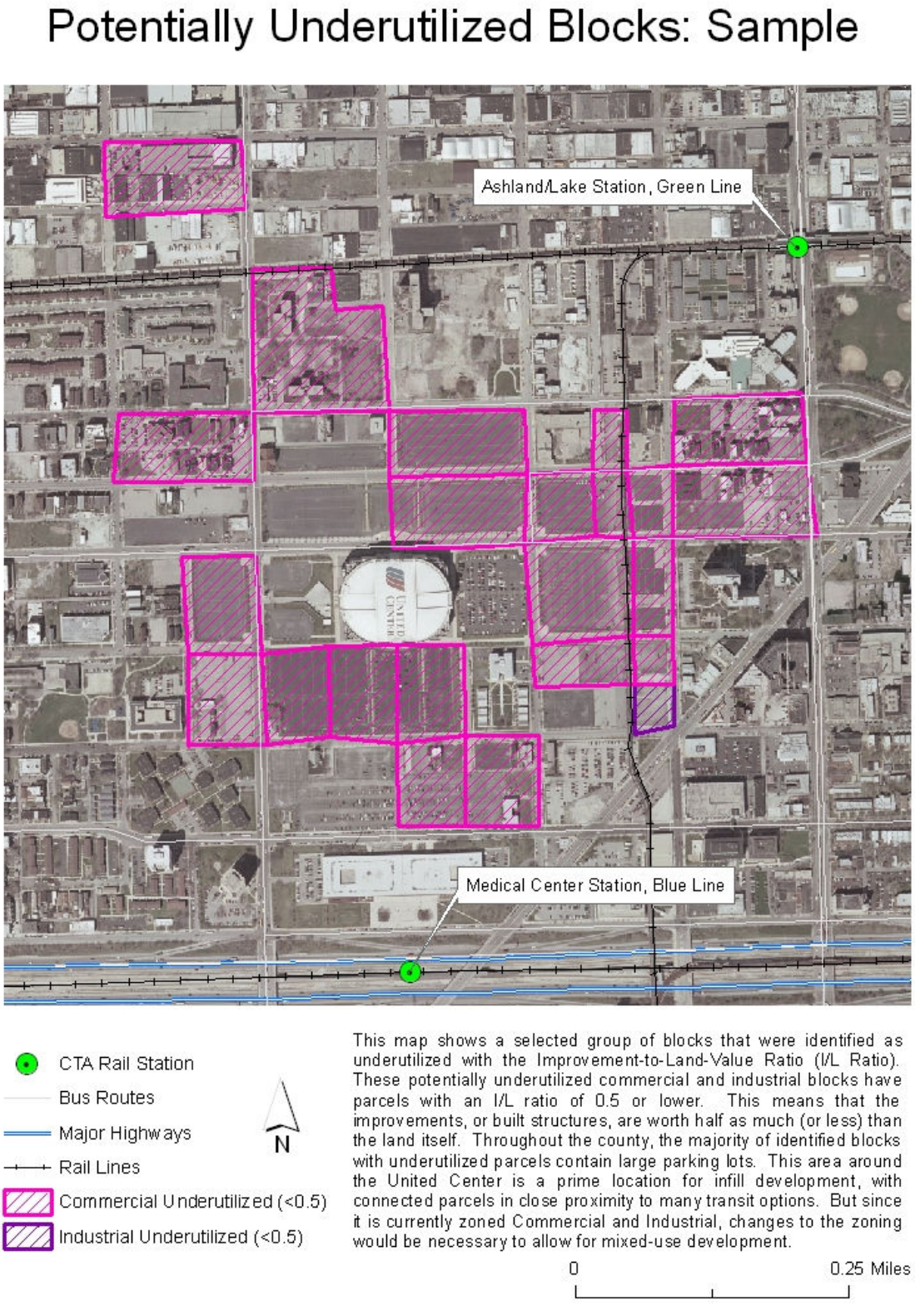


Figure 28. Aerial Image of Potentially Underutilized Blocks

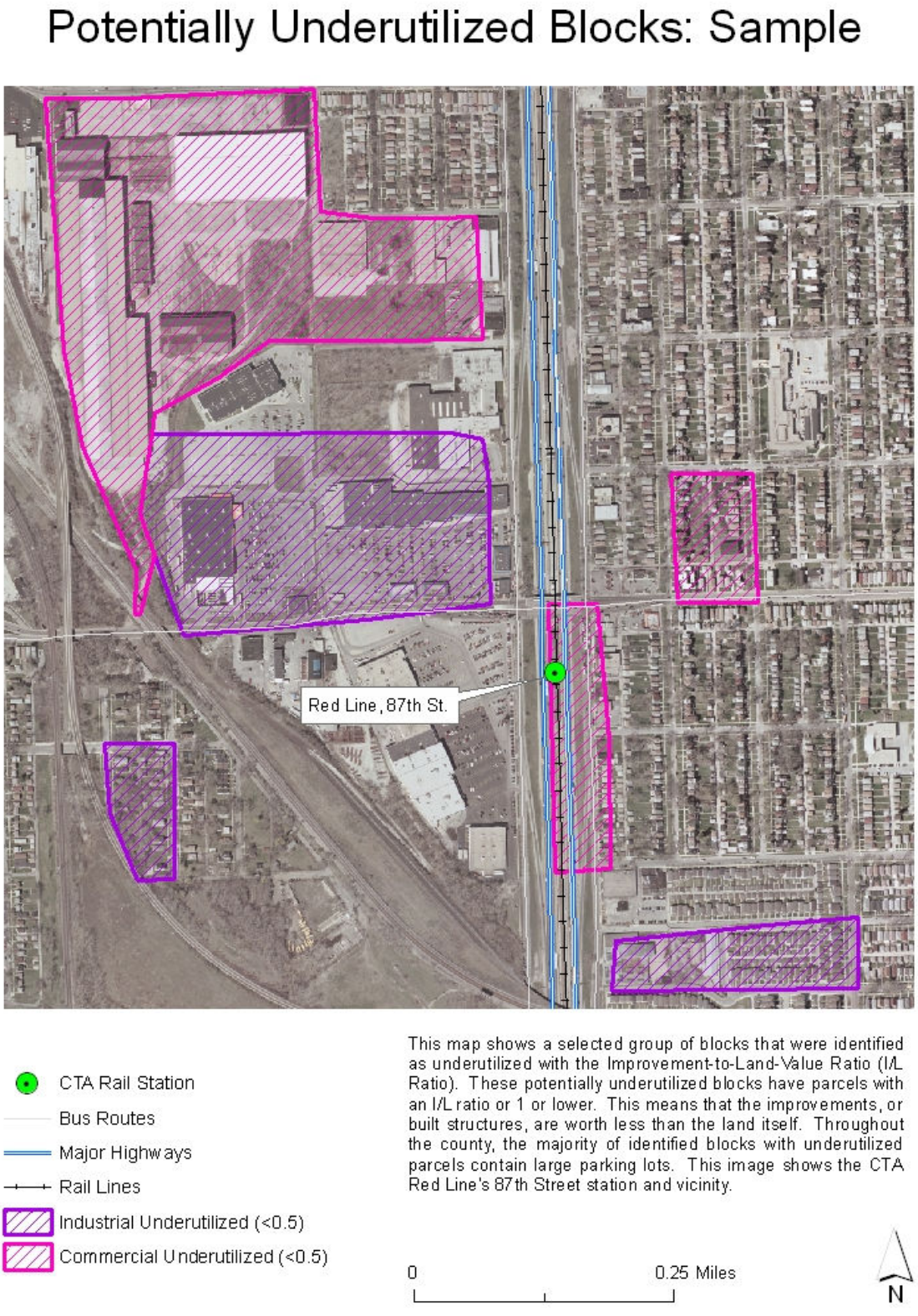


Figure 29. Aerial Image of Potentially Underutilized Blocks

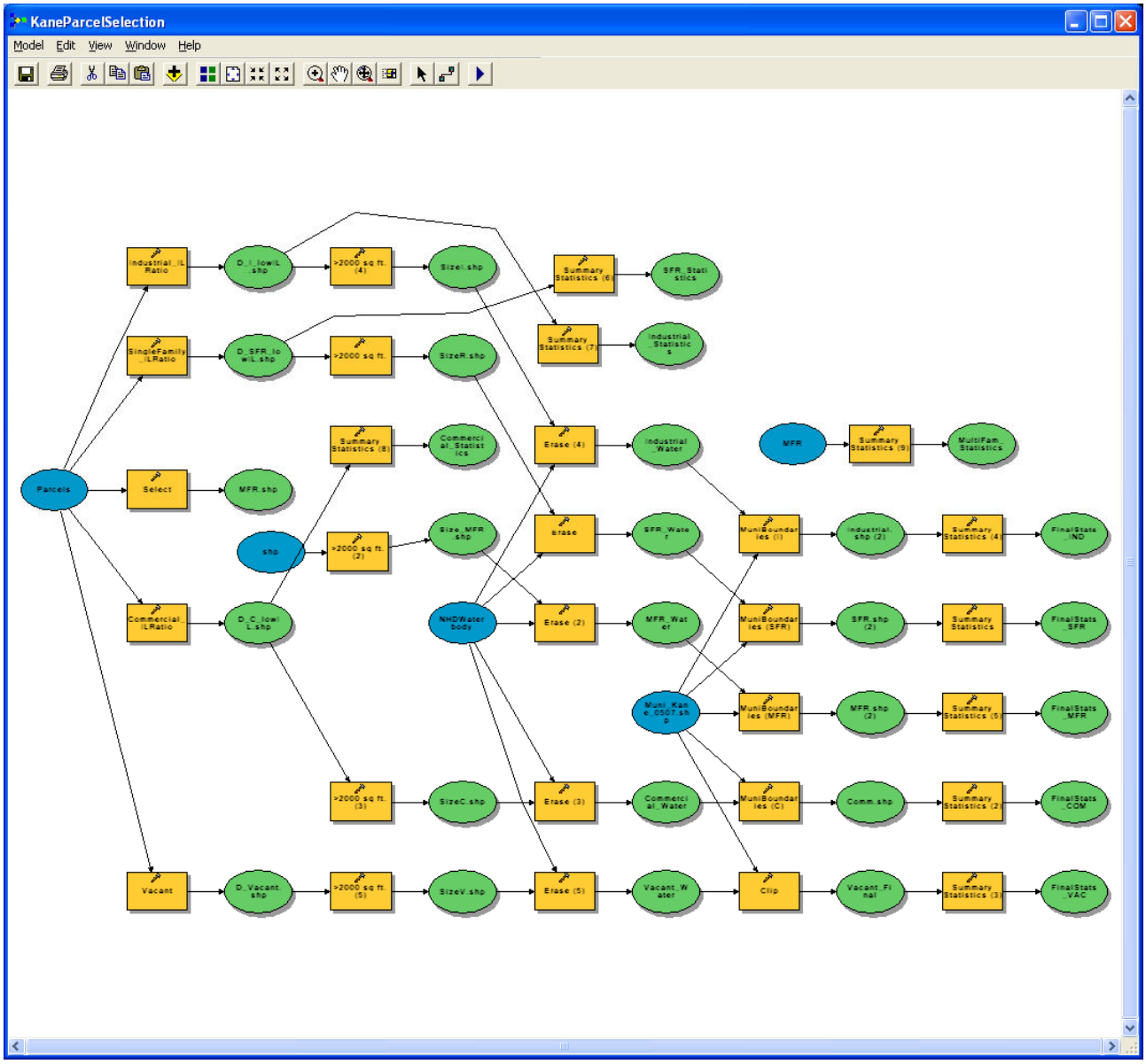


Figure 30. Sample Model to determine Infill Potential (Kane County)